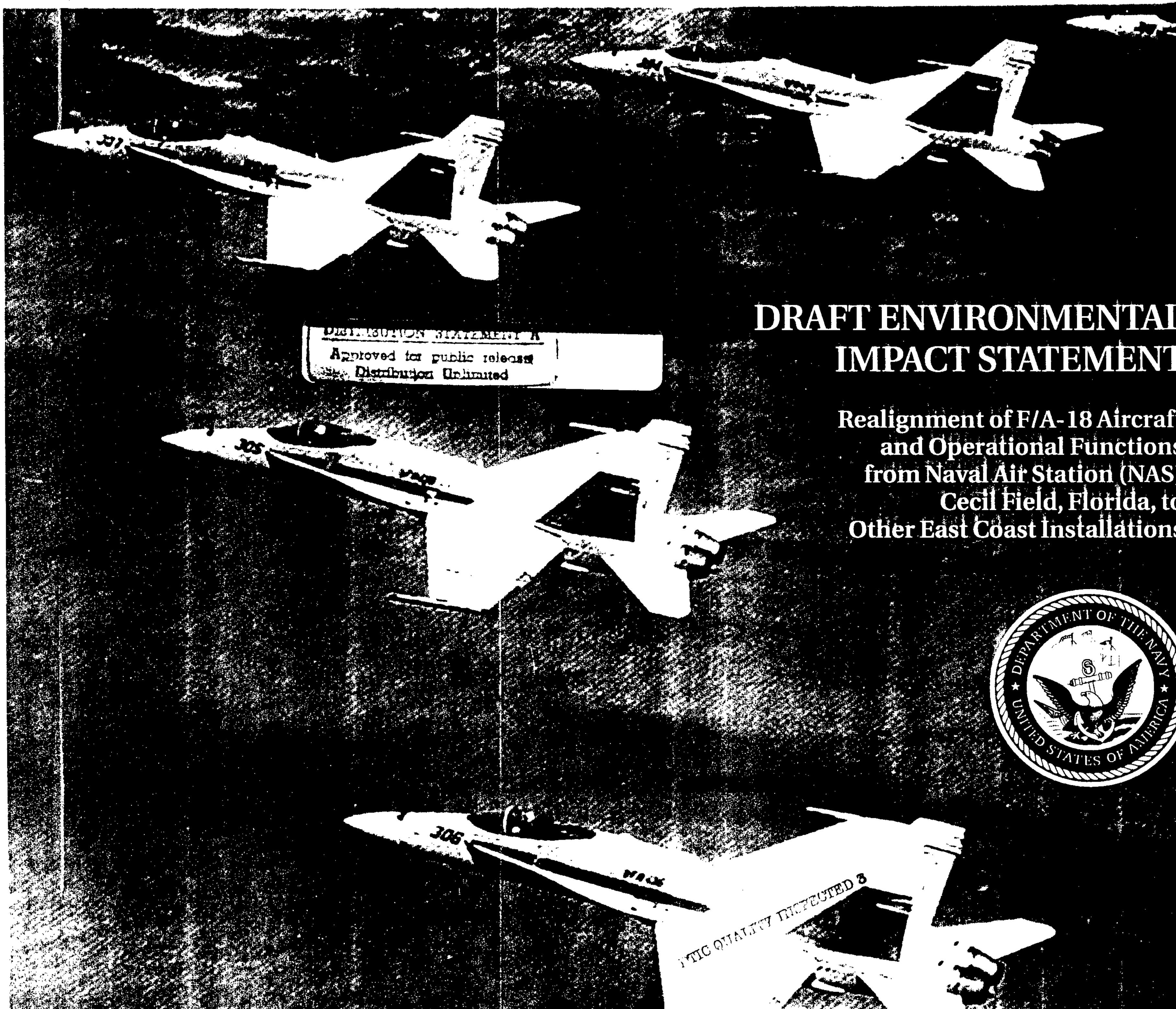
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Realignment of F/A-18 Aircraft and Operational Functions from Naval Air Station (NAS) Cecil Field, Florida, to Other East Coast Installations



Draft Environmental Impact Statement
Realignment of F/A-18 Aircraft and
Operational Functions From Naval Air Station
Cecil Field, Florida, to Other East Coast Installations

September 1997

Prepared by:

Department of the Navy

Abstract: This Draft Environmental Impact Statement (DEIS) addresses the environmental issues associated with the realignment of F/A-18 aircraft (i.e., fleet squadrons and the Fleet Replacement Squadron [FRS]) and operational functions from Naval Air Station (NAS) Cecil Field, Florida, which is scheduled to close, to other Navy and Marine Corps air stations on the East Coast. This proposed realignment is associated with the Navy's implementation of the 1995 mandated list of realignments prepared by the Defense Base Closure and Realignment Commission. The proposed action consists of the transfer of 11 F/A-18 fleet squadrons (132 aircraft) and the FRS (48 aircraft) (180 total aircraft) from NAS Cecil Field.

The DEIS assesses five reasonable alternative realignment scenarios (ARSs) for the transfer of F/A-18 aircraft and personnel:

- **ARS 1:** Realignment of 11 F/A-18 fleet squadrons (132 aircraft) and the F/A-18 FRS (48 aircraft) (180 total aircraft) to NAS Oceana, Virginia Beach, Virginia;
- **ARS 2:** Realignment of two F/A-18 fleet squadrons (24 aircraft) to Marine Corps Air Station (MCAS) Beaufort, South Carolina, and realignment of nine fleet squadrons and the FRS (156 total aircraft) to NAS Oceana;
- **ARS 3:** Realignment of three F/A-18 fleet squadrons (36 aircraft) to MCAS Cherry Point, North Carolina, and realignment of eight fleet squadrons and the FRS (144 total aircraft) to NAS Oceana;
- **ARS 4:** Realignment of five F/A-18 fleet squadrons (60 aircraft) to MCAS Beaufort; and realignment of six fleet squadrons and the FRS (120 total aircraft) to NAS Oceana; and
- **ARS 5:** Realignment of five F/A-18 fleet squadrons (60 aircraft) to MCAS Cherry Point and realignment of six fleet squadrons and the FRS (120 total aircraft) to NAS Oceana.

The proposed action involves the transfer of 4,200 positions (4,100 military and 100 civilian) from NAS Cecil Field. In addition, depending on the ARS, additional positions would need to be created at MCAS Cherry Point or MCAS Beaufort to facilitate the transfer of aircraft to more than one station.

Each ARS is assessed with regard to its effects on the natural and built environments.

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Executive Summary

Name of Action

The action evaluated in this draft environmental impact statement (DEIS) is the realignment of Atlantic Fleet F/A-18 fleet and FRS aircraft (i.e., F/A-18 fleet squadrons and the F/A-18 Fleet Replacement Squadron [FRS]) and operational functions from Naval Air Station (NAS) Cecil Field to other Navy and Marine Corps air stations on the east coast of the United States.

The action is an administrative action, undertaken by the U.S. Department of the Navy (Navy) to accommodate the realignment mandated by the U.S. Department of Defense's (DoD's) base closure and realignment process.

This EIS was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), Chief of Naval Operations Instruction (OPNAVINST) 5090.1B - Chapter 2, and the Defense Base Closure and Realignment Act (DBCRA) of 1990 (P.L. 101-510, Title XXIX).

Description of the Proposed Action

Based on the DoD's assessment of its military force structure, NAS Cecil Field is to be closed, and its critical functions and assets are to be transferred to other installations with excess capacity and support infrastructure. The F/A-18 fleet squadrons and FRS from NAS Cecil Field total 180 aircraft (11 squadrons of 12 aircraft each [132 total aircraft] and an FRS of 48 aircraft), and are supported by 4,200 military and civilian personnel. Installations that are being considered in five separate alternative realignment scenarios (ARSs) are: NAS Oceana, Virginia; Marine Corps Air Station (MCAS) Beaufort, South Carolina; and MCAS Cherry Point, North Carolina.

The proposed action for each ARS includes operational adjustments to accommodate F/A-18 aircraft in existing regional airspace structures, construction of new facilities, and

renovation of existing facilities in order to accommodate the Atlantic Fleet F/A-18 aircraft, their associated squadrons, and support personnel.

Alternatives

The 1993 Defense Closure and Realignment (BRAC) Commission directed the closure of NAS Cecil Field, Florida, and realigned its aircraft and personnel to MCAS Cherry Point, North Carolina, and MCAS Beaufort, South Carolina, and NAS Oceana, Virginia. The 1995 BRAC Commission redirected the realignment of NAS Cecil Field aircraft to "*...other naval air stations, primarily [NAS] Oceana; [MCAS] Beaufort, South Carolina; [NAS] Jacksonville, Florida; [NAS] Atlanta, Georgia; or other Navy and Marine Corps Air Stations with the necessary capacity and support infrastructure.*" This change was based on the Commission's intent to retain only that infrastructure necessary to support the Department of Defense's (DoD's) Force Structure Plan without impeding operational flexibility for deployment of that force. The overall goal was to optimize use of existing infrastructure, thereby reducing additional investment and ensuring that taxpayer dollars are spent in the most efficient way possible. The 1995 BRAC findings specifically stated that the Commission's intention was to avoid the substantial construction at MCAS Cherry Point required to support relocating F/A-18 aircraft under the 1993 BRAC mandates.

The Navy conducted a multi-stage screening process to identify operationally acceptable installations with the necessary capacity and support infrastructure to accommodate F/A-18 aircraft. This screening process consisted of a capacity analysis, an infrastructure analysis, and an operational readiness analysis. One-time costs and life-cycle costs necessary to implement relocation of F/A-18 fleet and FRS aircraft were also considered. The screening process resulted in the identification of ARSs, which were then further developed as the alternatives in this DEIS.

The capacity analysis paralleled that of the BRAC process by using available hangar capacity, measured in "hangar modules", as the primary indicator of whether existing capacity was present at a particular installation. Again parallel to the BRAC process, necessary support infrastructure at each installation was examined and issues such as runway capacity, maintenance and training infrastructure, and other support facilities, were considered. Finally, the operational analysis examined issues such as access to training ranges, airspace availability, Field Carrier Landing Practice (FCLP) requirements, safety, effects on combat readiness, and implementation life-cycle costs.

The Navy used Naval Facilities (NAVFAC) P-80 guidelines (P-80), its common standard for construction at Navy and Marine Corps Air Stations, to evaluate capacity and

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September 12, 1997

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DTIC Customer Service
Help Desk (DTIC-BLS)
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Re: *Draft Environmental Impact Statement (DEIS) for Realignment of F/A-18 Aircraft and Operational Functions From Naval Air Station (NAS) Cecil Field, Florida, to Other East Coast Installations*

To Whom It May Concern:

We are pleased to provide you the *DEIS for Realignment of F/A-18 Aircraft and Operational Functions From NAS Cecil Field, Florida, to Other East Coast Installations*. Included with the DEIS is the *Draft Clean Air Act Conformity Determination* prepared in compliance with the Clean Air Act General Conformity Rule. The realignment of F/A-18 aircraft and associated functions from NAS Cecil Field is mandated by the Defense Base Closure and Realignment Act (P.L. 101-510, Title XXIX) in accordance with the recommendation of the 1995 Defense Base Closure and Realignment Commission which was approved by the President and accepted by Congress. This DEIS has been prepared pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as implemented by the Council on Environmental Quality Regulations (40 CFR Parts 1500-1508), and considers five alternatives for realignment of 11 F/A-18 fleet squadrons (132 aircraft) and the fleet replacement squadrons (FRS) (48 aircraft).

East coast installations that meet the operational criteria for the aircraft include NAS Oceana, Virginia; Marine Corps Air Station (MCAS) Beaufort, South Carolina; and Marine Corps Air Station (MCAS) Cherry Point, North Carolina. The preferred alternative is to single-site the F/A-18 aircraft at NAS Oceana, which has the largest capacity to accommodate the aircraft. Alternatives that realign some of the F/A-18 aircraft to MCAS Beaufort and MCAS Cherry Point are also addressed. The level of new construction needed at each base to accommodate the aircraft is related to the number of aircraft to be transferred under each alternative. Each alternative is assessed in this DEIS with regard to its effects on the natural and built environments.

The enclosed DEIS and *Draft Clean Air Act Conformity Determination* are provided for your review. Additional single copies are available upon request by contacting Mr. Dan Cecchini at (757) 322-4891. Copies of the DEIS are also available for review at the following locations:

Virginia Beach Central Library
4100 Virginia Beach Boulevard
Virginia Beach, Virginia 23452
(757) 437-6450

Beaufort County Library
311 Scott Street
Beaufort, South Carolina 29902
(803) 525-4001

Great Neck Library
1251 Bayne Drive
Virginia Beach, Virginia 23454
(757) 496-6868

Chesapeake Central Library
298 Cedar Road
Chesapeake, Virginia 23320
(757) 382-8300

Craven County Library
300 Miller Boulevard
Havelock, North Carolina 28532
(919) 447-7509

Dare County Library
700 North U.S. 64/264
Manteo, North Carolina 27954
(919) 473-2372

Pamlico County Library
603 Main Street
Bayboro, North Carolina 28515
(919) 745-3515

Ida Hilton Public Library
1105 North Way
Darien, Georgia 31305
(912) 437-2124

Comments on the DEIS and *Draft Clean Air Act Conformity Determination* should be mailed or faxed to:

Commander, Atlantic Division
Naval Facilities Engineering Command
Attn: Mr. Dan Cecchini (Code 2032 DC)
1510 Gilbert Street
Norfolk, Virginia 23511

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Public hearings will be held during the month of October for those individuals who would like to provide verbal comments on the DEIS. The Navy will publish announcements of these hearings in the *Federal Register* and local newspapers at least two weeks in advance of the scheduled hearings.

All comments received by November 18, 1997, will be considered and addressed as appropriate in the *Final Environmental Impact Statement (FEIS) for Realignment of F/A-18 Aircraft and Operational Functions From Naval Air Station Cecil Field, Florida, to Other East Coast Installations.*

Any general questions or requests for clarification on the DEIS or public hearing/public comment schedule or procedures should be directed to the following individuals:

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Sincerely,

Charles W. Walker

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Head, Environmental Planning Branch

infrastructure. This publication provides planning guidance for determining the requirements for shore-based facilities needed to support Navy and Marine Corps operations. In addition, these guidelines are used to evaluate the adequacy of existing facilities, identify facility deficiencies or excesses, and validate construction project submittals. Thus, P-80 is the planning guidance that sets general standards for construction of Navy and Marine Corps facility infrastructure. Identification and application of these guidelines enabled the Navy to identify potential receiving installations and determine those ARSs considered reasonable for further comparison.

All ARSs had to be operationally and functionally acceptable. Additionally, all ARSs had to be consistent with the BRAC recommendation to utilize excess capacity and infrastructure at potential receiving installations. The following basic considerations, in addition to those discussed in Section 2.2, were used to develop the ARSs:

- At least one ARS had to consider siting all F/A-18 fleet and FRS aircraft at one installation to replace to the greatest extent practicable the operational and logistical characteristics currently experienced with all Atlantic Fleet F/A-18 fleet and FRS aircraft stationed at NAS Cecil Field. From operations, logistics support, and life-cycle cost perspectives, single-siting all F/A-18 aircraft is preferred to siting aircraft in multiple locations. Multiple locations complicate required logistics and degrade synergism (i.e., interrelationships between various functions associated with training, deployment, and maintenance of Navy F/A-18 fleet and FRS aircraft).

- An ARS consisting of splitting Atlantic Fleet F/A-18 fleet and FRS assets among more than two locations was considered unacceptable because of operational constraints and high support costs associated with maintaining and operating F/A-18 assets in multiple locations. Further, it would sacrifice the readiness levels and effectiveness of training for F/A-18 pilots and support personnel. The Navy's current authorized personnel levels, and the funding ceilings for such levels, as well as the Navy's inventory of F/A-18 parts and equipment, would not be able to fully support such a separation. The degraded capabilities resulting from these inabilities were considered so undesirable that they would preclude relocation of the Atlantic Fleet Navy F/A-18 assets to three locations, because it would not be technically, logistically, or economically feasible (see Section 2.6.4).

- Consideration had to be given to the implications of "carrier airwing" configurations, which are subsets of the overall Atlantic Fleet strike/fighter wing consisting of groupings of aircraft squadrons to facilitate deployment with aircraft carriers. A normal carrier airwing includes two or three Navy F/A-18 squadrons, depending on the availability of other fighter/attack aircraft (e.g., Navy F-14s, Marine Corps F/A-18s). Therefore, ARSs could not include the relocation of only one F/A-18 fleet squadron to a particular location.

- An ARS consisting of splitting the F/A-18 FRS from the majority of fleet squadrons was considered unacceptable because of specific training, logistical, and maintenance interrelationships between the FRS and fleet squadrons. Within the past 30 years, the FRS has never been separated from operational squadrons of the same type/model/series aircraft, except for short-term training detachments. Separating the FRS from the majority of the fleet squadrons would detract significantly from the ability of the FRS and fleet squadrons to support each other, which has proven to be of great value. For example, the practice of loaning aircraft or parts to provide the needed capability for deploying squadrons would be rendered very costly and difficult. Maintenance parts, equipment, and personnel do not currently exist in the Navy's inventory to fully support such a separation. Squadron training requires use of the two-seat version of the F/A-18 aircraft assigned to the FRS, and necessary training on night vision equipment would likewise be significantly impacted. Finally, the Navy would incur significant cost increases and management difficulties associated with the assignment of personnel. The degraded capabilities resulting from separating the FRS from the majority of the fleet aircraft are thus considered unacceptable.

The Navy conducted an initial screening analysis on 20 Navy and Marine Corps air installations located along the Atlantic coast and the Gulf of Mexico. Many of the installations identified as potential receiving sites failed to meet more than one of the screening criteria. The installations were evaluated on capacity; infrastructure, including runway safety, training, maintenance, and ancillary facility infrastructure; and operational readiness such as proximity to ranges, FCLP requirements, and compatibility of F/A-18 operations with other airfield operations. Section 2.2 summarizes the screening process, and discusses installations that did not meet specific criteria.

Three installations met all required criteria and were identified as reasonable candidate installations for receiving F/A-18 fleet and FRS aircraft: NAS Oceana, MCAS Beaufort, and MCAS Cherry Point.

The following three reasonable ARSs were then developed based on identified excess capacity:

- **ARS 1:** Relocating all 11 F/A-18 fleet squadrons and the FRS to NAS Oceana.
- **ARS 2:** Relocating 2 F/A-18 fleet squadrons to MCAS Beaufort and 9 fleet squadrons and the FRS to NAS Oceana.
- **ARS 3:** Relocating 3 fleet squadrons to MCAS Cherry Point and 8 fleet squadrons and the FRS to NAS Oceana.

During the development of these ARSs, it became apparent that relocating the F/A-18 aircraft to NAS Oceana would result in significant aircraft noise impacts associated with the large increase in airfield operations. Therefore, the Navy decided to consider other operationally feasible scenarios that could potentially reduce noise impacts.

- **ARS 4:** Relocating five F/A-18 fleet squadrons to MCAS Beaufort and six fleet squadrons and the FRS to NAS Oceana.
- **ARS 5:** Relocating five F/A-18 fleet squadrons to MCAS Cherry Point and six fleet squadrons and the FRS to NAS Oceana.

As has been noted, no ARS would meet P-80 guidelines without some additional construction. While the 1995 BRAC mandates are intended to maximize use of existing resources and minimize creation of new facilities, the most efficient use of existing resources would still necessitate some additional construction regardless of where the F/A-18 aircraft are relocated. It should be noted that by adding alternatives that place five F/A-18 fleet squadrons at MCAS Beaufort or MCAS Cherry Point, the capacity of NAS Oceana, defined by P-80 as eight hangar modules, would be fully utilized by the remaining six fleet squadrons and the FRS. MCAS Beaufort and MCAS Cherry Point each possess some available unused hangar capacity and are otherwise acceptable as receiving sites. Additional construction at either of these sites would allow capacity at NAS Oceana to be fully utilized, would use existing capacity at one of the two Marine Corps air stations, and would result in the most noise mitigation possible, consistent with operational requirements. Therefore, additional hangar module construction at MCAS Beaufort or MCAS Cherry Point is considered reasonable in the context of providing an alternative that mitigates noise impacts at NAS Oceana.

Conversely, major expansion at an installation not already having some existing capacity or requiring acquisition of real estate and construction of additional infrastructure would be unreasonable as long as other installations exist that could provide the infrastructure without degrading operational requirements.

The five ARSs are described in the following paragraphs.

ARS 1: Transfer of 11 F/A-18 Fleet Squadrons (132 Aircraft) and F/A-18 FRS (48 Aircraft) to NAS Oceana, Virginia

ARS 1 is the Navy's preferred alternative. From an operational perspective, it is clear that the best configuration of the Atlantic Fleet F/A-18 strike/fighter wing would result from relocating all the F/A-18 fleet squadrons and the FRS to a single installation. Reasons for this include:

- Training efficiency through interaction among F/A-18 squadrons and elimination of either the costs of transporting trainees to other training locations or constructing flight simulator facilities at multiple locations;

- Maintenance and logistic efficiency through elimination of the need for multiple spare part/equipment stocks or turnaround times necessary to get parts to and from a single repair site; and

- Personnel efficiency by eliminating the duplication in personnel inherent to siting aircraft in multiple locations.

Accordingly, a single-site alternative was developed as ARS 1. The three candidate receiving installations were examined to determine if all F/A-18 aircraft could be relocated within the parameters of the 1995 BRAC mandate. In doing so, adjustments were made to projected needs considering typical deployment schedules. Hangar space occupied by deployed squadrons would be used by squadrons remaining at the installation (typically referred to as "hot racking"). Such hangar module utilization practices are normal at most Navy and Marine Corps air stations.

Even with adjustments for deployments, none of the three installations would be able to house all F/A-18 fleet and FRS aircraft to P-80 guidelines. Given the need for 11 available hangar modules in place at any one time and the operational preference for a single site, NAS Oceana, having eight available modules, is the only reasonable single-site location due to its available capacity and the relative costs involved. With the construction of an additional three-module hangar and aircraft parking apron, NAS Oceana could house all the F/A-18 aircraft to P-80 guidelines.

Single-siting would not be possible at either MCAS Beaufort or MCAS Cherry Point, even with an additional three-module hangar. MCAS Beaufort would still be deficient by six modules; MCAS Cherry Point would still be deficient by five modules; and NAS Oceana's capacity would remain underutilized. Thus, NAS Oceana is the only reasonable location for a single-site scenario among the three candidate installations.

Implementation of ARS 1 would require 13 construction projects, primarily consisting of reuse/renovation of existing facilities and/or additions to existing facilities. These would consist of the following:

- Minor parking apron alterations, including installation of steel plates along the flight line to protect the pavement and 400-hertz (Hz) converters to provide additional power for parked aircraft;
- Two-story addition to Building 140 for an F/A-18 flight simulator facility;
- One-story addition and interior modifications to Building 140 for a Naval Maintenance Training Group Detachment (NAMTRAGRUD-ET) training facility;
- Three additions to Building 137 for a Strike Fighter Weapons School facility and parking lot;
- A series of small additions and freestanding construction projects to support F/A-18 maintenance facilities, and two parking lots;
- Construction of a new hangar facility for corrosion control and aircraft painting;
- Installation of vaults in Buildings 111 and 122 for classified document storage;
- Renovations to Building 122, including installation of interior walls and utilities to the hangar;
- A new 230-unit bachelor enlisted quarters (BEQ) and parking;
- Renovation of Building 1100 for jet engine testing;
- A new one-story aircraft acoustical enclosure to test high-powered in-aircraft engine run-ups;
- Construction of a new three-module aircraft hangar; and
- Expansion of the aircraft parking apron to provide additional space for F/A-18 aircraft.

The net present value of 30-year life-cycle costs of implementing ARS 1 would be approximately $250 million in 1998 dollars.

ARS 2: Transfer of Two F/A-18 Fleet Squadrons (24 Aircraft) to MCAS Beaufort, South Carolina, and Transfer of Nine F/A-18 Fleet Squadrons (108 Aircraft) and the F/A-18 FRS (48 Aircraft) to NAS Oceana, Virginia

This alternative would maximize the use of excess hangar and apron capacity at MCAS Beaufort, and send the remaining F/A-18 assets, including the FRS, to NAS Oceana. It would have the added advantage of collocating one airwing with Navy and Marine Corps F/A-18 squadrons. Accommodating two squadrons at MCAS Beaufort would require deviations from P-80 criteria with regard to parking apron requirements; however, these deviations would not significantly affect airfield efficiency.

While this scenario would seem to mitigate the hangar module deficiency at NAS Oceana, it would still result in the same capacity deficiency at NAS Oceana as ARS 1 (i.e., a three-module deficiency) for periods when the MCAS Beaufort carrier airwing would be deployed (i.e., approximately 20% of deployment schedules). Construction of a three-module hangar would still be required at NAS Oceana.

Two fleet squadrons can be absorbed at MCAS Beaufort without any significant aircraft maintenance facility (i.e., Aircraft Intermediate Maintenance Department [AIMD]) expansions, because there are available Marine Corps mobile AIMD facilities that can support the two additional squadrons. Because of maintenance requirements, relocating more than two F/A-18 fleet squadrons at MCAS Beaufort would require the construction of an AIMD and new hangar modules.

The following projects would be necessary at MCAS Beaufort to implement ARS 2:

- Parking apron alterations, including installation of steel plates along the flight line to protect the pavement, Hz converters to provide additional power for parked aircraft, and construction of a 390,000-square-foot Mobile Facilities (MF) Pad;
- Construction of a crew, equipment, and administrative building adjacent to the MF Pad; and
- Hangar renovations to Building 729.

Under ARS 2, the large majority of F/A-18 assets would still be transferred to NAS Oceana. Therefore, it would still be the logical location of the majority of F/A-18 maintenance, training, and personnel support facilities. The transfer of 24 aircraft to MCAS Beaufort would not proportionately reduce the size or number of facilities that would be required to conduct these activities. Therefore, projects at NAS Oceana under ARS 2 would be the same as ARS 1.

The net present value of the 30-year life-cycle costs of implementing ARS 2 would be approximately $283 million in 1998 dollars.

ARS 3: Transfer of Three F/A-18 Fleet Squadrons (36 Aircraft) to MCAS Cherry Point, North Carolina, and Transfer of Eight F/A-18 Fleet Squadrons (96 Aircraft) and the F/A-18 FRS (48 Aircraft) to NAS Oceana, Virginia

This alternative maximizes the use of existing hangar and apron capacity at MCAS Cherry Point by sending one three-squadron carrier airwing to MCAS Cherry Point and the remaining F/A-18 assets, including the FRS, to NAS Oceana. As with ARS 2, accommodating three squadrons at MCAS Cherry Point would require deviations from P-80 criteria with regard to parking apron requirements; however, these deviations would not significantly affect airfield efficiency.

This scenario would reduce the hangar module deficiency at NAS Oceana compared to ARS 1 or 2. NAS Oceana would be deficient by only two modules for periods when the MCAS Cherry Point fleet squadrons would be deployed (i.e., approximately 20% of deployment schedules). Construction of a two-module hangar instead of a three-module hangar would be required at NAS Oceana.

AIMD activities at MCAS Cherry Point are assigned to Marine Aircraft Logistical Squadron (MALS)-14. Currently, there is no F/A-18 repair capability at MCAS Cherry Point. Therefore, a stand-alone F/A-18 AIMD facility would be required to support the realignment of three fleet squadrons of Navy F/A-18 aircraft to this station.

The following projects would be necessary at MCAS Cherry Point to implement ARS 3:

- Parking apron alterations, including installation of steel plates along the flight line to protect the pavement, Hz converters to provide additional power for parked aircraft;
- Hangar renovations to Building 1665W, 131S, and 1700; and
- The construction of an AIMD facility consisting of specialized shops for F/A-18 aircraft.

Similar to ARS 2, ARS 3 would still involve the majority of F/A-18 assets being transferred to NAS Oceana. With the exception of smaller parking apron expansion and aircraft hangar, the projects at NAS Oceana under ARS 3 would be the same as those under ARS 1. The aircraft hangar would need to consist of only 2 modules and the apron expansion would be reduced to accommodate 24 aircraft.

The net present value of the 30-year life-cycle costs of implementing ARS 3 would be approximately $440 million in 1998 dollars.

ARS 4: Transfer of Five F/A-18 Fleet Squadrons (60 Aircraft) to MCAS Beaufort, South Carolina, and Transfer of Six F/A-18 Fleet Squadrons (72 Aircraft) and the F/A-18 FRS (48 aircraft) to NAS Oceana, Virginia

This alternative would utilize all existing capacity at both MCAS Beaufort and NAS Oceana. It would have the added advantage of collocating the Navy and Marine Corps F/A-18 squadrons, which comprise one carrier airwing, at MCAS Beaufort.

MCAS Beaufort would require expansion of the parking apron, construction of a three-module hangar, and building renovation. To accommodate the projected F/A-18 operations, a new parallel runway would be required. This scenario would fully utilize existing hangar capacity at NAS Oceana. Existing hangars would be reused/renovated to accommodate the F/A-18 aircraft.

Existing Marine Corps mobile AIMD facilities at MCAS Beaufort could support two Navy F/A-18 fleet squadrons. Because there is not enough capacity to conduct maintenance on five Navy F/A-18 aircraft, an AIMD facility would be constructed to ensure adequate specialized maintenance. At NAS Oceana, F/A-18 aircraft maintenance would be accomplished with existing facility additions and renovation.

The following projects would be necessary at MCAS Beaufort to implement ARS 4:

- Expansion of the aircraft parking apron, taxiway, and Mobile Facilities (MF) Pad;
- Parking apron alterations, including installation of steel plates along the flight line to protect the pavement and 400-Hz converters to provide additional power for parking aircraft;
- Construction of a crew, equipment, and administration building;
- Renovation of aircraft hangars;
- Construction of a new 8,000-foot (2,438-meter) parallel runway;
- Relocation of the Carrier Armament Loading Area (CALA) Pad, which is currently located in the area of the proposed runway;
- Construction of a three-module aircraft hangar;
- Construction of an aircraft refueling system;
- Construction of a new AIMD facility;

- Expansion of F/A-18 flight simulator facilities;
- Construction of a missile magazine;
- Construction of a flight line medical clinic;
- Expansion of the wastewater treatment plant at the Laurel Bay Family Housing Area;
- Construction of a new BEQ;
- Construction of a child development center; and
- Construction of 240 units of family housing at the Laurel Bay Family Housing Area.

The net present value of the 30-year life-cycle costs of implementing ARS 4 would be approximately $663 million in 1998 dollars.

ARS 5: Transfer of Five F/A-18 Fleet Squadrons (60 Aircraft) to MCAS Cherry Point, North Carolina and Transfer of Six F/A-18 Fleet Squadrons (72 Aircraft) and the F/A-18 FRS (48 Aircraft) to NAS Oceana, Virginia

This alternative would maximize the use of excess capacity at MCAS Cherry Point and NAS Oceana.

MCAS Cherry Point would require expansion of the parking apron, construction of a three-module hangar, and building renovation. To accommodate the projected F/A-18 operations, a new parallel runway would be required. This scenario would generally eliminate the hangar module deficiency at NAS Oceana. Existing hangars would be re-used/renovated to accommodate the F/A-18 aircraft.

AIMD activities at MCAS Cherry Point are assigned to MALS-31. Currently, there is no F/A-18 repair capability at MCAS Cherry Point; therefore, a stand-alone F/A-18 AIMD facility would be required to support this ARS.

The following projects would be necessary at MCAS Cherry Point to support ARS 5:

- Parking apron alterations, including installation of steel plates along the flight line to protect the pavement and 400-Hz converters to provide additional power for parked aircraft;
- Renovations/addition to aircraft hangars;
- Construction of an AIMD facility;
- Expansion of the flight simulator;

- Construction of a flight line medical clinic;
- Construction of a child development center;
- Expansion of the parking apron; and
- Construction of a new 8,000-foot (2,438-meter) parallel runway/facility relocation site.

The net present value of the 30-year life-cycle costs of implementing ARS 5 would be approximately $519 million in 1998 dollars.

Summary of Significant Environmental Impacts

A comparative summary of the environmental impacts under each of the ARSs is presented in Table 2.5-1.

ARS 1 would consolidate all F/A-18 assets at NAS Oceana. Because of this, it would best meet each of the operational criteria, such as use of existing infrastructure, one-time costs, and life-cycle costs. Conversely, it would result in the greatest level of environmental impacts. These impacts would be related to land use, noise, air quality, and traffic around NAS Oceana, the most significant of these being noise.

Increases in aircraft operations would result in expansion and reconfiguration of Accident Potential Zones (APZs) around the airfield. In addition, new areas in noise zones 2 (65 to 75 dB) and 3 (greater than 75 dB) would increase significantly over the 1978 Air Installations Compatible Use Zone (AICUZ) Program by 22,264 acres (9,010 hectares), impacting an additional 38,983 people. Analysis of resulting noise impacts at NAS Oceana also indicates some reduction in noise levels for an estimated population of 10,345 people due to existing aircraft flight operations. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 6 to 22 dB increase over existing conditions. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern.

ARS 1 would result in an air emissions increase associated with increased aircraft operations and maintenance. The projected net emissions changes of volatile organic

compounds and nitrogen oxides are included in the Virginia maintenance plan for conformance with National Ambient Air Quality Standards, and therefore, projected emissions would be in compliance with the state implementation plan and would not be a significant impact. Traffic conditions on some roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 1. Specifically, a section of Oceana Boulevard from Bells Road to Princess Anne Road would degrade from Level of Service (LOS) E to F. This would be considered a significant impact. Several planned traffic improvement projects including expansion of Oceana Boulevard, would reduce traffic congestion.

ARS 2 would realign the majority of the F/A-18 assets to NAS Oceana, and the remaining assets would go to MCAS Beaufort. It would maximize the use of existing capacity at MCAS Beaufort; however, new facilities would still need to be developed at NAS Oceana to support the majority of F/A-18 assets. As such, one-time costs and life-cycle costs would be higher than ARS 1.

Increases in aircraft operations would result in expansion and reconfiguration of APZs around the airfield. In addition, new areas in noise zones 2 (65 to 75 dB) and 3 (greater than 75 dB) would increase over the 1994 AICUZ Program by 7,054 acres (2,855 hectares), impacting an additional 2,303 people. Analysis of resulting noise impacts at MCAS Beaufort also indicates some reduction in noise levels for an estimated population of 250 people due to existing aircraft flight operations. No significant impact to air quality would result because South Carolina is in attainment status for all criteria pollutants, and projected emissions would not impact this status. ARS 2 would not impact traffic; level of service would not be significantly degraded.

At NAS Oceana, the area covered by APZs and noise contours would be slightly less under ARS 2 than ARS 1. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 21 dB increase over existing conditions. Impacts under ARS 2 are very similar to ARS 1, with reductions of no more than 1 dB occurring at any location. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern. The noise exposure in the region under ARS 2 would still be a significant increase over existing conditions. Net increases in air emissions projected under ARS 2 would be slightly less than under ARS 1.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 2. Specifically, a section of Oceana Boulevard from Bells Road to Princess Anne Road would degrade from LOS E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

ARS 3 would realign the majority of F/A-18 assets to NAS Oceana, and the remaining assets would go to MCAS Cherry Point. Similar to ARS 2, this would result in greater one-time and life-cycle costs than ARS 1.

Increases in aircraft operations would result in expansion and reconfiguration of APZs around the airfield. In addition, new areas in noise zones 2 (65 to 75 dB) and 3 (greater than 75 dB) would increase over the 1988 AICUZ Program by 3,120 acres (1,263 hectares), impacting an additional 1,981 people. Analysis of resulting noise impacts at MCAS Cherry Point also indicates some reduction in noise levels for an estimated population of 67 people due to existing aircraft flight operations. Four schools would continue to be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 1 to 4 dB increase over existing conditions. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern. No significant impact to air quality would result because North Carolina is in attainment status for all criteria pollutants, and projected emissions would not impact this status. ARS 3 would not impact traffic; level of service would not be significantly degraded.

At NAS Oceana, the area covered by APZs and noise contours would be slightly less under ARS 3 than ARS 1. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions. Impacts under ARS 3 are very similar to ARS 1, with reductions of 1 to 2 dB at some locations. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering

evaluations at schools of particular concern. The noise exposure in the region under ARS 3 would still be a significant increase over existing conditions. Net increases in air emissions projected under ARS 3 would be slightly less than under ARS 1.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 3. Specifically, a section of Oceana Boulevard from Bells Road to Princess Anne Road would degrade from LOS E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

ARS 4 would split the F/A-18 assets between MCAS Beaufort and NAS Oceana. This would result in greater one-time and life-cycle costs as a result of construction of new facilities and duplication of some maintenance and training functions. Impacts at MCAS Beaufort would be greater than for ARS 2.

Increases in aircraft operations would result in expansion and reconfiguration of APZs around the airfield. In addition, areas in noise zones 2 (65 to 75 dB) and 3 (greater than 75 dB) would increase over the 1994 AICUZ Program by 9,729 acres (3,938 hectares), impacting an additional 3,127 people. Analysis of resulting noise impacts at MCAS Beaufort also indicates some reduction in noise levels for an estimated population of 333 people due to existing aircraft flight operations. No significant impact to air quality would result because South Carolina is in attainment status for all criteria pollutants, and projected emissions would not impact this status. ARS 4 would not impact traffic; level of service would not be significantly degraded.

At NAS Oceana, the area covered by APZs and noise contours would be slightly less under ARS 4 than ARS 1. The noise exposure in the region under ARS 4 would still be a significant increase over existing conditions. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions. Impacts under ARS 4 are very similar to ARS 1, with reductions of 1 to 2 dB at most locations. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern. Net increases in air emissions projected under ARS 4 would be slightly less than under ARS 1.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 4. Specifically, a section of Oceana Boulevard from Bells Road to Princess Anne Road would degrade from LOS E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

ARS 5 would split the F/A-18 assets between MCAS Cherry Point and NAS Oceana. This would result in greater one-time and life-cycle costs as a result of construction of new facilities and duplication of some maintenance and training functions. Impacts at MCAS Cherry Point would be greater than for ARS 3.

Increases in aircraft operations would result in expansion and reconfiguration of APZs around the airfield. In addition, new areas in noise zones 2 (65 to 75 dB) and 3 (greater than 75 dB) would increase over the 1988 AICUZ Program by 4,869 acres (1,971 hectares), impacting an additional 3,232 people. Analysis of resulting noise impacts at MCAS Cherry Point also indicates some reduction in noise levels for an estimated population of 61 people due to existing aircraft flight operations. Four schools would continue to be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 1 to 5 dB increase over existing conditions. Impacts under ARS 5 are very similar to ARS 3 with a 1 dB increase at three of the four schools. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern. No significant impact to air quality would result because North Carolina is in attainment status for all criteria pollutants, and projected emissions would not impact this status. Traffic conditions on Fontana Road (NC 101) between Crocker/Roosevelt Road and Cunningham Boulevard and conditions on U.S. 70 between Jackson Road and NC 101 would be significantly impacted by ARS 5, degrading from LOS B to E, and LOS C to E, respectively. The Navy would work with the North Carolina Department of Transportation to increase the level of service and reduce traffic impacts on this road.

At NAS Oceana, the area covered by APZs and noise contours would be slightly less under ARS 5 than ARS 1. The noise exposure in the region under ARS 5 would still be a significant increase over existing conditions. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB

increase over existing conditions. Impacts under ARS 5 are very similar to ARS 1, with reductions of 1 to 2 dB at most locations. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern. Net increases in air emissions projected under ARS 5 would be slightly less than under ARS 1.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 5. Specifically, a section of Oceana Boulevard from Bells Road to Princess Anne Road would degrade from LOS E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

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List of Acronyms

1,1-DCA	1,1-dichloroethane
"A" Area	Alert Area
AAD	average annual day
ABD	average busy day
AECs	Areas of Environmental Concern
AESO	Aircraft Environmental Support Office
A/G	air-to-ground
AICUZ	Air Installations Compatible Use Zones
AIMD	aircraft intermediate maintenance department
ALF	auxiliary field
ALM	A-weighted maximum sound level
AOC	area of concern
AOD	airport overlay district
APOE	aerial port of embarkation
APZ	accident potential zone
ARS	alternative realignment scenario
AST	aboveground storage tank
ATC	Air Traffic Control
BAQ	Basic Allowance for Quarters
BEQ	bachelor enlisted quarters
BGS	below ground surface
BJWSA	Beaufort-Jasper Water and Sewer Authority
BOQ	Bachelor Officer Quarters
BRAC	base closure and realignment
BT	bombing target

List of Acronyms (Cont.)

BTEX	Benzene, toluene, ethylbenzene, and xylenes
BUS	Business Route
C&D	construction and demolition
CAA	Clean Air Act
CALA	Carrier Armament Loading Area
CAMA	North Carolina Coastal Area Management Act
CCA	Carrier-Controlled Approach
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CINCLANTFLT	Commander-in-Chief, U.S. Atlantic Fleet
CIP	Capital Improvements Program
cis-1,2-DCE	cis-1,2-dichloroethylene
Cl^-	chloride ion
CMS	Corrective Measures Study
CNO	Chief of Naval Operations
CNR	Composite Noise Rating
CO	carbon monoxide
COMNAVAIRLANT	Commander, Naval Air Force, U.S. Atlantic Fleet
CP&L	Carolina Power and Light Company
CPO	Chief Petty Officer
CWA	Clean Water Act
dB	decibel
dbh	diameter at breast height
DEIS	draft environmental impact statement
DBCRA	Defense Base Closure and Realignment Act of 1990
DoD	Department of Defense
DODINST	Department of Defense Instruction
DRMO	Defense Reutilization and Marketing Office
EA	environmental assessment
EEM	estuarine emergent
EIS	environmental impact statement
EMS	emergency medical service

List of Acronyms (Cont.)

EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FACSFAC VACAPES	Fleet Area Control Surveillance Facility/Virginia Capes
FBO	Forward Base Operations
FCA	Fleet Concentration Area
FCLP	Field Carrier Landing Practice
FL	flight level
FONSI	Finding of No Significant Impact
FPUS	fixed-point utility systems
FRS	Fleet Replacement Squadron
FY	fiscal year
GCA	ground controlled approach
GIS	Geographic Information System
gpd/ft^2	gallons per day per square foot
GPD	gallons per day
GPS	Global Positioning System
GSE	ground support equipment
H^+	hydrogen ion
HABS	Historic American Buildings Survey
HAZMAT	hazardous materials
HC	hydrocarbon
HC-AICUZ	highway commercial-air installations compatible use zones
HRSD	Hampton Roads Sanitation District
HSWA	Hazardous and Solid Waste Amendments
HTHW	high-temperature hot water
HUD	U.S. Department of Housing and Urban Development
Hz	hertz
IAS	indicated air speed
IFR	instrument flight rule
IR	instrument route
IRP	Installation Restoration Program
IWTP	industrial wastewater treatment plant

List of Acronyms (Cont.)

JRB	Joint Reserve Base
kV	kilovolt
L/R	left/right
lbs	pounds
Ldn	day-night average sound level
Ldnmr	onset-rate adjusted day-night average sound level
Leq	school-day noise equivalent
LI-AICUZ	light industrial-air installations compatible use zones
LOA	Letter of Agreement
LOS	level of service
LSO	Landing Signal Officer
MAEWR	Mid-Atlantic Electronic Warfare Range
MAG	Marine Aircraft Group
MALS	Marine Aircraft Logistical Squadron
MAW	Marine Aircraft Wing
MCALF	Marine Corps Auxiliary Landing Field
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
MCO	Marine Corps Order
MF	mobile facilities
MGD	million gallons per day
MILCON	Military Construction
MLD	million liters per day
MOA	military operating area
MSL	mean sea level
MTR	military training route
MWR	Morale, Welfare, and Recreation
N:P ratio	ratio of nitrogen-to-phosphorus
NAAQS	National Ambient Air Quality Standards
NADEP	Naval Aviation Depot
NALF	Naval Auxiliary Landing Field
NAMTRAGRUDET	Naval Maintenance Training Group Detachment

List of Acronyms (Cont.)

NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NASMOD	Naval Aviation Simulation Model
NATOPS	Naval Air Training Operating Standards
NATS	Naval Aviation Training System
NAVAIRLANT	Commander, Naval Air Forces, Atlantic
NAVFACENGCOM	Naval Facilities Engineering Command
NCAC	North Carolina Administrative Code
NCDEHNR	North Carolina Department of Environment, Health, and Natural Resources
NCDOT	North Carolina Department of Transportation
NEC	Navy Enlisted Classification
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NLR	noise level reduction
NM	nautical miles
NO_2	nitrogen dioxide
NOI	Notice of Intent
NOTAM	Notice to Airmen
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPV	net present value
NRHP	National Register of Historic Places
NSA	New South Associates
NS	Naval Station
NSPS	New Source Performance Standards
NSW	nutrient-sensitive waters
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
O_3	ozone

List of Acronyms (Cont.)

OCRM	South Carolina Office of Ocean and Coastal Resource Management
OLF	outlying field
OMB	Office of Management and Budget
OPNAVINST	Chief of Naval Operations Instruction
OSHA	Occupational Safety and Health Administration
OU	operable units
PAR	Precision Approach Radar
PCBs	Polychlorinated Biphenyls
PCI	Panamerican Consultants, Inc.
PEM/PSS	palustrine emergent/palustrine scrub-shrub
PFO	palustrine forested
PM_{10}	particulate matter
POL	petroleum, oil, and lubricants
PPV	public/private venture
PSD	Prevention of Significant Deterioration
QRP	Qualified Recycling Program
"R" area	Restricted Area
RBS	Readiness Based Sparing
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI/FS	Remedial Investigation/Feasibility Study
RIMAIR	Repairables Integrated Model for Aircraft
RIMS II	Regional Input-Output Model
ROICC	Resident Officer-in-Charge of Construction
SC	South Carolina
SCCZMP	South Carolina Coastal Zone Management Program
SCDAH	South Carolina Department of Archives and History
SCDHEC	South Carolina Department of Health and Environmental Control
SCE&G	South Carolina Electric & Gas

List of Acronyms (Cont.)

SCHRIMP	Station Consolidated Hazardous Materials Re-Utilization and Inventory Management Program
SDWA	Safe Drinking Water Act
SECNAVINST	Secretary of the Navy Instructional
SECP	Sediment and Erosion Control Plan
SEL	sound exposure level
SHORCAL	Shore Activity Aviation Consolidated Allowance List
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMP	Stormwater Management Plan
SO_2	sulfur dioxide
SOP	standard operating procedure
SPCC	Spill Prevention, Containment and Countermeasure
SR	State Route
SSTP	sanitary sewage treatment plant
STIP	SCDOT Transportation Improvement Plan
SWMU	solid waste management unit
SWTR	shallow-water training range
TACAN	tactical air navigation
TACTS	Tactical Aircrew Combat Training System
TBR	Townsend Bombing Range
TCE	trichloroethylene
$TiCl_4$	Titanium tetrachloride
$TiOH_4$	titanium hydroxide complex
TIP	transportation improvement plan
TOFT	Tactical Operational Flight Trainer
TWA	time-weighted average decibel value
UMCS	Utility Monitoring and Control System
USACE	United States Army Corps of Engineers
USC	University of South Carolina
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
V/C	volume to capacity

List of Acronyms (Cont.)

VCMP	Virginia Coastal Management Program
VDA	Virginia Department of Agriculture
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDHR	Virginia Department of Historic Resources
VFR	visual flight rule
VHA	Variable Housing Allowance
VOC	volatile organic compound
VPDES	Virginia Pollutant Discharge Elimination System
"W" area	Warning Area

1 Introduction

As a result of the 1993 and 1995 mandates of the Defense Base Closure and Realignment (BRAC) Commission, Naval Air Station (NAS) Cecil Field, the current homeport of the Atlantic Fleet Strike/Fighter Wing, will be closed, and its critical functions and assets will be transferred to other installations. This draft environmental impact statement (DEIS) addresses the primary environmental issues associated with various alternative scenarios to realign Atlantic Fleet F/A-18 fleet and FRS aircraft (i.e., the strike/fighter wing) from NAS Cecil Field to other east coast air stations.

The proposed action includes the accommodation of F/A-18 aircraft in existing regional airspace structures, construction of new facilities, and renovation of existing facilities at one or more east coast installations, in order to accommodate the Atlantic Fleet F/A-18 fleet and FRS aircraft, their associated squadrons, and support personnel.

This DEIS was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), Chief of Naval Operations Instruction (OPNAVINST 5090.1B - Chapter 2), and the Defense Base Closure and Realignment Act of 1990 (P.L. 101-510, Title XXIX).

1.1 Purpose and Need

The purpose of the proposed action is compliance with the 1995 BRAC Commission mandates as approved by the President and accepted by Congress, specifically, the realignment of Atlantic Fleet F/A-18 fleet and FRS aircraft from NAS Cecil Field in order to further the objectives of these mandates. This involves taking the actions necessary to implement the relocation of Atlantic Fleet F/A-18 operational functions and assets, such as advanced planning/design activities, to other locations and construction of suitable facilities at receiving installations of F/A-18 aircraft. Authorization to conduct such activities is provided under the Defense Base Closure and Realignment Act (DBCRA).

The DBCRA established a process to close and realign military installations in the United States to achieve long-term cost savings. Under this statute, the U.S. Secretary of Defense prepared a Force Structure Plan and submitted a list of bases for closure and realignment to an independent BRAC Commission. The Commission convened public hearings, reviewed selected installations according to the Force Structure Plan and selection criteria, amended the list as necessary, and then submitted the list to the President for approval. Following Presidential approval, the list was forwarded to Congress for acceptance. Once the list was approved and accepted, the Secretary of Defense was mandated to proceed with the closures and realignments as specified.

On June 28, 1993, the Commission recommended the closure of 76 military installations (BRAC Commission 1993). Included was the closure of NAS Cecil Field in Jacksonville, Florida, a Navy master jet base and the current site of the Navy's Atlantic Fleet F/A-18 aircraft (F/A-18 Fleet aircraft and the F/A-18 Fleet Replacement Squadron [FRS]), F/A-18 reserve aircraft, and S-3 aircraft. As a result of the planned closure of NAS Cecil Field, all aircraft stationed there, and the associated military and civilian personnel, were to be transferred to the Marine Corps Air Station (MCAS) Cherry Point, North Carolina; MCAS Beaufort, South Carolina; and NAS Oceana, Virginia.

In 1995, as a result of changes initiated by the fiscal year (FY) 2001 Force Structure Plan to further reduce military force levels, the Commission revised its recommendations regarding this action, by changing the ultimate receiving installations for NAS Cecil Field aircraft and personnel to *"... other naval air stations, primarily [NAS] Oceana; [MCAS] Beaufort, [NAS] Jacksonville, Florida; [NAS] Atlanta, Georgia; or other Navy or Marine Corps air stations with necessary capacity and support infrastructure."* (BRAC Commission 1995).

Because the 1995 BRAC mandates did not direct F/A-18 fleet and FRS aircraft from NAS Cecil Field to specific receiving installations, various alternative installations were identified to potentially receive Atlantic Fleet F/A-18 aircraft. These aircraft are part of the Atlantic Fleet strike/fighter wing. Therefore, they must be relocated to a Navy or Marine Corps installation that can facilitate the accomplishment of their strike/fighter wing mission.

Their purpose is to provide the U.S. Atlantic Fleet Commanders with strike/fighter squadrons capable of performing all assigned missions. The strike/fighter squadrons are assigned to the carrier air wings that deploy aboard aircraft carriers homeported on the east coast of the United States, located at Norfolk, Virginia and Mayport, Florida. At-sea training for these aircraft occurs in training areas in the Atlantic Ocean (off the coasts of Virginia, the Carolinas, and Florida) and the eastern Caribbean Sea. Assignments historically have these squadrons deploying with their east coast carriers to conduct operations primarily in the Atlantic Ocean and Mediterranean Sea.

1.2 Public Involvement

A notice of intent (NOI) to prepare an environmental impact statement (EIS) in accordance with NEPA was published in the *Federal Register* on November 16, 1995 (see Appendix A). The NOI indicated that the Navy intended to conduct a separate NEPA documentation process for each potential receiving installation of NAS Cecil Field F/A-18 fleet and FRS aircraft (i.e., NAS Oceana, MCAS Beaufort, and NAS Atlanta). Information on the Navy's proposed action, NOI, and scoping process for the EIS was mailed to federal, state, and local elected officials and agency representatives, as well as other interested parties such as public interest groups, civic leagues, and individuals (see Section 16).

A scoping process was conducted to identify key issues of concern to be assessed in the DEIS. This process commenced on November 16, 1995 and ended on January 5, 1996. During this period, five public scoping meetings were held to receive comments from agencies and members of the public on issues of concern that should be assessed in the DEIS. Public notices describing the Navy's intent to prepare an EIS and announcing the public scoping meetings were published in the following newspapers (see Appendix A):

- The *Virginian-Pilot* and the *New Bern* (North Carolina) *Sun-Journal* on November 26, 27, and 28, 1995; and
- The *Carteret County* (North Carolina) *News-Times* on November 26, 28, and December 1, 1995.

Three meetings were conducted in North Carolina to allow for comments to be submitted by interested parties in the vicinity of military training areas used by aircraft at NAS Oceana. Two scoping meetings were conducted in Virginia to provide interested parties in the vicinity of NAS Oceana the opportunity to comment on the scope of the EIS. The date, location, and attendance at each meeting were as follows:

- December 5, 1995, 7:00 P.M., Carteret County Courthouse, Courthouse Square, U.S. Route 70, Beaufort, North Carolina (17 people);
- December 6, 1995, 7:00 P.M., Pamlico County Courthouse, N.C. Highway 55 (near N.C. Highway 304), Bayboro, North Carolina (35 people);
- December 7, 1995, 7:00 P.M., North Carolina Aquarium and Marine Resources Center, Main Auditorium, Airport Road (adjacent to the Dare County Airport), Manteo, North Carolina (33 people);

- December 12, 1995, 7:00 P.M., Seatack Elementary School Main Auditorium, 411 Birdneck Road, Virginia Beach, Virginia (11 people); and

- December 13, 1995, 7:00 P.M., Butts Road Intermediate School Gymnatorium, 1571 Mount Pleasant Road, Chesapeake, Virginia (22 people).

On August 23, 1996, the Navy published an amended NOI in the *Federal Register*, indicating its intent to conduct a single NEPA documentation process for realignment of all Atlantic Fleet F/A-18 fleet and FRS aircraft from NAS Cecil Field, eliminating the need to prepare separate documentation at various potential receiving installations (see Appendix A). The amended NOI stated that the EIS would assess a series of alternative scenarios for realignment of Atlantic Fleet F/A-18 fleet and FRS aircraft to one or more of the following installations: NAS Oceana, MCAS Beaufort, and MCAS Cherry Point. In accordance with BRAC mandates, the Navy's preliminary planning analysis indicated that these installations exhibited excess capacity and infrastructure to support Atlantic Fleet F/A-18 fleet and FRS aircraft. The amended NOI also stated that although a single EIS would be prepared for realignment of F/A-18 fleet and FRS aircraft, separate NEPA documentation would still be prepared for realignment of F/A-18 reserve and S-3 aircraft from NAS Cecil Field. These separate NEPA documentation activities involved the preparation of an environmental assessment (EA) for the realignment of F/A-18 reserve aircraft to NAS Atlanta, Georgia, and an EA for the realignment of S-3 aircraft to NAS Jacksonville, Florida. Each resulted in the issuance of a Finding of No Significant Impact (FONSI) by the Navy.

In order to provide for adequate public comment on the EIS in light of the amended NOI, the Navy reopened the scoping period, commencing on August 23, 1996, and ending on October 5, 1996. As during the Navy's original scoping period, information on the Navy's amended NOI was mailed to federal, state, and local elected officials and agencies, as well as other interested parties.

Also during this period, two additional public scoping meetings were held to receive comments from agencies and members of the public. Public advertisements describing the Navy's revised NOI to prepare an EIS and announcing the additional public scoping meetings were published in the following newspapers (see Appendix A):

- The *New Bern* (North Carolina) *Sun-Journal* and the *Beaufort* (South Carolina) *Gazette* on September 1, 2, and 3, 1996; and

- The *Carteret County* (North Carolina) *News-Times* on September 1, 4, and 6, 1996.

The meetings were conducted in Havelock, North Carolina and Beaufort, South Carolina to provide interested parties in the vicinity of MCAS Cherry Point and MCAS Beaufort the opportunity to comment on the scope of the EIS. The date, location, and attendance at each meeting were as follows:

- September 10, 1996, 7:00 P.M., Havelock City Hall, Council Chambers, 1 Hatteras Avenue, Havelock, North Carolina (68 people); and
- September 11, 1996, 7:00 P.M., Technical College of the Lowcountry, Learning Resource Center Auditorium, 921 Ribaut Road, Beaufort, South Carolina (15 people)

All of the seven scoping meetings consisted of a presentation of pertinent issues associated with the proposed action by Navy representatives, followed by the public comment period. Sign-in sheets documenting meeting attendance were maintained, and each meeting was transcribed by a court reporter to obtain an accurate record of the comments received. Official transcripts of each meeting are not included in this DEIS, but are on file with the Navy.

Forty people made public comment statements, and 21 comments were submitted in writing at the public scoping meetings. In addition, 88 comment letters were received by the Navy before the close of the comment period on October 5, 1996.

Issues and concerns have been derived from comments received during the scoping period, discussions/correspondence with federal, state, and local agencies, and data collection efforts for the DEIS. A summary of these issues and concerns regarding the proposed action and where they are addressed in this DEIS is presented in Table 1.2-1.

Table 1.2-1

LIST OF ISSUES IDENTIFIED IN SCOPING COMMENTS

Issue	Number of Comments Received	DEIS Section
Virginia Scoping Comments		
Noise Impacts to Sensitive Land Uses	11	4.8
Socioeconomic Impacts—Positive	3	4.5
Socioeconomic Impacts—Negative	3	4.5
Air Impacts in Virginia Beach/Hampton Roads Region	4	4.9
Moving Two Schools	2	3.1.4.2
School Overcrowding	3	4.5.2
Negative Impacts to Quality of Life in Virginia Beach	5	4.8; 4.5
Fiscal Implications of Moving Two Schools	1	3.1.4.2
Air Installation Compatible Use Zone (AICUZ) Changes	2	4.4; 4.8
Virginia Coastal Resources Management Program Impacts	1	4.4
Wetlands Impacts on Site	2	4.11.3
Water Quality Impacts/Permits Required for New Construction	1	4.11; 15
Impacts to Stormwater Control System	1	4.6.3
Impacts on Potable Water Supplies from Increased Personnel	4	4.6.1
Impacts to Habitats for Rare, Threatened, or Endangered Species	4	4.12.3
Increased Noise Impacts on Church Services	1	4.8
Impacts to Upper Wolfsnare Plantation from Noise, Vibration, and Viewshed Due To Runway Expansion	2	4.13
Threats from Toxic or Hazardous Materials	1	4.14
Energy and Water Conservation Plans	1	3.1.6
Pollution and Waste Reduction Plans	2	3.1.14; 3.1.6
Impacts on Lower Income and Minority Communities	1	9
Impacts on Vehicular Traffic	4	4.7
Plans for Reducing or Minimizing Traffic Impacts	1	4.7
Impacts in Approach Zones	3	4.4
Concerns about Uncontrolled Growth	1	4.4

Table 1.2-1

LIST OF ISSUES IDENTIFIED IN SCOPING COMMENTS

Issue	Number of Comments Received	DEIS Section
Impacts to Availability of Housing	1	4.5
North Carolina Scoping Comments		
Impacts on Wildlife at Dare County, BT-9, BT-11 Due to Increased Air Operations	7	4.3
Impacts on Migratory Birds in Atlantic Flyway	8	4.3
Effects on Sediment and Water Quality in Pamlico Sound and Resources in North Carolina	4	4.3
Aircraft Impacts in BT-9 and BT-11	8	4.3
Increased Noise at Training Ranges	9	4.3
Addressing Citizen Concerns About Noise Levels	9	4.8; 14.0
Noise Impacts Along Military Training Routes and Over Civilian and State Properties	14	4.2
Decreased Public Access to Coastal Public Trust Lands and Waters	2	4.2
Concerns Over Safety and Efficiency of State Resource Management Emergency Response Aircraft	6	4.2
Socioeconomic Impacts	21	4.5; 6.1.5; 8.1.5
Increased Use of Special Use Airspace and Military Training Routes for Aircraft Operations	9	4.2
Impacts of Bombing Activities on Soil, Surface Water, Groundwater, Sediments, and Wildlife Tissue	7	4.3
Impacts on Growth Patterns	9	4.3
Increased Potential for Contamination Due To Aircraft Accidents	2	4.3
Impacts on Visitors and Wildlife Due to Increased Noise at State Recreation Areas	5	4.3
Potential for Forest Fires Due to Off-Target Ordnance Drops	3	4.3
Increased Requirements for Radar Coverage and Air Traffic Control (Airspace Management)	12	9.0
Impacts on Safety of Civilian, Commercial, and General Aviation Flights	6	4.2; 9.0
Better Quality of Life than Hampton Roads	3	2.0
Community Infrastructure Improvements Would Support Realignment at Cherry Point	7	2.0; 3.2.6

Table 1.2-1

LIST OF ISSUES IDENTIFIED IN SCOPING COMMENTS

Issue	Number of Comments Received	DEIS Section
Hazardous Waste Issues at MCAS Cherry Point	3	3.3.14; 6.1.14; 8.1.14
Solid Waste Issues from Realignment to MCAS Cherry Point	1	3.3.6
Use of Consistent Benchmark Data and Criteria for All Alternative Siting Locations	6	2.0
Potential for Increased Incident of Accidents Due To Training	2	4.3
Request to See Detailed Flight Operations Maps (Altitudes, Routes, Time, Entry and Exit Routes, Geographical Benchmarks)	1	3.1.2; 3.1.3
Impacts of Military Activities (Including Dredging on North Carolina Coastal Waters)	2	4.2; 4.3
Effects of Construction and Other Activities on Wetlands and Surface Water Resources	3	6.1.11; 8.1.11
Potential Need for an OLF in Eastern North Carolina	1	2.0
Increased Communication Between State and Military Pilots During Flight	1	9.0
Loss of Forest Resources Due to Increased Construction	1	6.1.12; 8.1.12
Impacts to Historically and Architecturally Significant Housing on Base	1	6.1.13; 8.1.13
Lack of Air Quality Concerns Around Cherry Point	7	6.1.9; 8.1.9
Less Population Impacted in Event of an Accident	2	6.1.8; 8.1.8
Cherry Point has Necessary Infrastructure/Resources to Provide for Population Increase at the Station	12	6.1.6; 8.1.6
Training Missions Will Take Place Over North Carolina; Some Economic Benefit Should be Received	8	6.1.5; 8.1.5
Strategic Concern of Locating F/A-18 Forces at One Base	1	2.0
Traffic Congestion and Decreased Infrastructure Capacity Due to Increased Population at the Station	1	6.1.6; 8.1.6
Should Not Mix Marine and Navy Personnel	1	2.0
Water Is Not Affected by Base Operations	1	6.1.11; 8.1.11
South Carolina Scoping Comments		
Support for Realignment to MCAS Beaufort	7	2.0

Table 1.2-1

LIST OF ISSUES IDENTIFIED IN SCOPING COMMENTS

Issue	Number of Comments Received	DEIS Section
Noise Concerns/Increased Air Traffic Impact on Adjacent Land Uses	9	5.1.8; 7.1.8
Concern of Cumulative Negative Impacts from Realignment to MCAS Beaufort	6	9.0
Impact of Increased Construction on Water Quality	2	5.1.11; 7.1.11
Concerned that Economy of Beaufort Is Too Reliant on Military	1	3.2.5
Infrastructure Unable to Support Realignment	3	5.1.6; 7.1.6
Limited and Expensive Housing Available	3	3.2.5
Increased Traffic on Roadways Cause Concern	3	5.1.7; 7.1.6
Concern Over School Crowding	2	5.1.5; 7.1.5
Increased Potential for Accidents	1	5.1.4; 7.1.4; Appendix G

2 Alternatives

This section discusses the process used to formulate reasonable alternatives for realigning Atlantic Fleet F/A-18 fleet and FRS aircraft. It also describes the screening process used to determine acceptable facilities with respect to operational compatibility and capacity. Construction projects and operational changes are presented for five alternative realignment scenarios (ARSs). Section 3, Affected Environment, provides full discussions of the existing environmental conditions, and Sections 4, 5, 6, 7, and 8 present potential impacts of implementing each ARS.

2.1 Background

As discussed in Section 1, the 1993 BRAC Commission directed the closure of NAS Cecil Field, Florida, and realigned its aircraft, along with dedicated personnel, equipment, and support, to MCAS Cherry Point, North Carolina; NAS Oceana, Virginia; and MCAS Beaufort, South Carolina. The 1995 BRAC Commission redirected the realignment of NAS Cecil Field aircraft to "*...other naval air stations, primarily [NAS] Oceana; [MCAS] Beaufort, South Carolina; [NAS] Jacksonville, Florida; [NAS] Atlanta, Georgia; or other Navy and Marine Corps Air Stations with the necessary capacity and support infrastructure.*" This recommendation was based on the Commission's intent to retain only that infrastructure necessary to support the Department of Defense's (DoD's) Force Structure Plan without impeding operational flexibility for deployment of that force (BRAC Commission 1995). The overall goal was to optimize use of existing infrastructure, thereby reducing additional investment and ensuring that taxpayer dollars are spent in the most efficient way possible. The 1995 BRAC findings specifically stated that the Commission's intention was to avoid the substantial construction at MCAS Cherry Point required to support relocating F/A-18 aircraft under the 1993 BRAC mandates (BRAC Commission 1995).

The Navy conducted a multi-stage screening process to identify operationally acceptable installations with the necessary capacity and support infrastructure to accommodate F/A-18 aircraft. This screening process consisted of a capacity analysis, an infrastructure analysis, and an operational readiness analysis. One-time costs and life-cycle costs necessary to implement relocation of F/A-18 fleet and FRS aircraft were also considered. The screening process resulted in the identification of alternative realignment scenarios (ARSs), which were then further developed as the alternatives in this DEIS.

The screening process focused only upon F/A-18 Atlantic fleet and FRS aircraft. This included 11 fleet squadrons, each consisting of 12 aircraft (i.e., 132 aircraft) and the F/A-18 FRS, consisting of 48 aircraft. The FRS provides intermediate training for pilots reporting to a fleet squadron for their first assignment after basic training and refresher training for experienced pilots returning to fleet squadrons. As discussed in Section 1, two F/A-18 reserve squadrons and six S-3 squadrons have been realigned to NAS Atlanta and NAS Jacksonville, respectively. Realignment of these squadrons was evaluated in separate NEPA documents because they have different missions and support requirements, and the selection of a receiving site was a functionally independent decision.

In developing the ARSs, the Navy considered the capacity and infrastructure criteria established in the Navy BRAC screening process, as well as operational requirements and cost

implications. The capacity analysis paralleled that of the BRAC process by using available hangar capacity, measured in "hangar modules", as the primary indicator of whether existing capacity is present at a particular installation. Support infrastructure at each installation was also examined and issues such as runway capacity, maintenance and training infrastructure, and other support facilities, were considered. Finally, the operational analysis examined issues such as access to adequate training ranges, airspace availability, FCLP requirements, safety, effects on combat readiness, and implementation life-cycle costs.

The Navy used Naval facilities *(NAVFAC) P-80* guidelines (P-80), its common guideline for construction at Navy and Marine Corps Air Stations, to evaluate capacity and infrastructure. This publication provides planning guidance for determining the requirements for shore-based facilities needed to support Navy and Marine Corps operations. In addition, these P-80 guidelines are used to evaluate the adequacy of existing facilities, identify facility deficiencies or excesses, and validate construction project submittals. Thus, P-80 is the planning guidance that sets general standards for construction of Navy and Marine Corps facility infrastructure. Identification and application of these guidelines enabled the Navy to identify potential receiving installations and determine those ARSs considered reasonable for further comparison.

All ARSs had to be operationally and functionally acceptable. Additionally, all ARSs had to be consistent with the BRAC recommendation to utilize existing capacity and infrastructure at potential receiving installations. The following basic considerations, in addition to those discussed in Section 2.2, were used to guide development of the ARSs (Commander, Naval Air Force, U.S. Atlantic Fleet [COMNAVAIRLANT] 1996a, 1997):

- At least one ARS had to consider siting all F/A-18 fleet and FRS aircraft at one installation to replicate to the greatest extent practicable the operational and logistical characteristics currently experienced with all Atlantic Fleet F/A-18 fleet and FRS aircraft stationed at NAS Cecil Field. From operations, training, logistics support, and life-cycle cost perspectives, single-siting all F/A-18 aircraft is preferred to siting aircraft in multiple locations. Multiple locations complicate required logistical decisions and degrades synergism (i.e., interrelationships between various functions associated with training, deployment, and maintenance of Navy F/A-18 fleet and FRS squadrons).

- An ARS consisting of splitting Atlantic Fleet F/A-18 fleet and FRS assets among more than two locations was considered unacceptable because of operational constraints and high support costs associated with maintaining and operating F/A-18 assets in multiple locations. Further, it would sacrifice the readiness levels and effectiveness of training for F/A-18 pilots and support personnel. The Navy's

current authorized personnel levels, and the funding ceilings for such levels, as well as the Navy's inventory of F/A-18 parts and equipment, would not be able to fully support such a separation. The technical, logistical, and economic problems resulting from the dispersal of F/A-18 aircraft to multiple receiving sites were considered so undesirable that they precluded relocation of the Atlantic Fleet Navy F/A-18 assets to more than two locations.

- Consideration had to be given to the implications of "carrier air wing" configurations, which are subsets of the overall Atlantic Fleet strike/fighter wing consisting of groupings of aircraft squadrons to facilitate deployment with aircraft carriers. A normal carrier air wing includes two or three Navy F/A-18 squadrons, depending on the availability of other fighter/attack aircraft (e.g., Navy F-14s, Marine Corps F/A-18s). Therefore, ARSs could not include the relocation of only one F/A-18 fleet squadron to a particular location.

- An ARS consisting of splitting the F/A-18 FRS from a majority of fleet squadrons was considered unacceptable because of specific training, logistical, and maintenance interrelationships between the FRS and fleet squadrons. Within the past 30 years, the FRS has never been separated from operational squadrons of the same type/model/series aircraft, except for short-term training detachments. Separating the FRS from the majority of the fleet squadrons would detract significantly from the ability of the FRS and fleet squadrons to support each other, which has proven to be of great value. For example, the practice of loaning aircraft or parts to provide the needed capability for deploying squadrons would be rendered very costly and difficult. Maintenance parts, equipment, and personnel do not currently exist in the Navy's inventory to fully support such a separation. Squadron training requires use of the two-seat version of the F/A-18 aircraft assigned to the FRS, and necessary training on night vision equipment would likewise be significantly impacted. Finally, the Navy would incur significant cost increases and management difficulties associated with the assignment of personnel. The degraded capabilities resulting from separating the FRS from the majority of the F/A-18 squadrons are thus considered unacceptable.

Many of the installations identified as potential receiving sites failed to meet more than one of the screening criteria. Section 2.2 summarizes the results of the screening process, lists all installation screening criteria, and clearly identifies all criteria that were not met.

2.2 Screening Process

2.2.1 Basic Parameter for Identification of Potential Receiving Installations

Several Navy and Marine Corps air stations were identified as potential receiving installations for NAS Cecil Field F/A-18 fleet and FRS aircraft. The initial stage of identifying potential receiving installations was guided by the following basic parameter:

- The NAS Cecil Field F/A-18 fleet and FRS aircraft should be relocated within the Commander-in-Chief, U.S. Atlantic Fleet (CINCLANTFLT) area of responsibility (i.e., along the Atlantic coast and Gulf of Mexico).

Only Atlantic coast and Gulf of Mexico installations were considered as potential receiving installations because the NAS Cecil Field F/A-18 aircraft are part of the Navy's Atlantic Fleet and would be deployed on Atlantic Fleet aircraft carriers. Normal practice within the Navy has been to homeport Atlantic Fleet ships and aircraft within the CINCLANTFLT area of responsibility. This practice represents one of the most basic concepts for force structure planning and directly affects authorized personnel and equipment strength levels. It simplifies logistics and supply chains, minimizes overhead and transit costs, and meets Navy goals for minimizing the time spent by personnel away from their homeports on deployments and other missions.

With only two exceptions, all Navy aircraft have been homeported in this manner. Only the Navy's EA-6B and F-14 communities have all squadrons homeported at a single installation. The EA-6B community, which is located on the west coast, is only about 15% as large as the F/A-18 community. F-14 aircraft are part of a shrinking community and are expected to be deleted from of the Navy's active inventory as early as 2008. As a result, the 1995 BRAC Commission recommended realignment of Pacific Fleet F-14 aircraft to NAS Oceana, home of all Atlantic Fleet F-14s. These circumstances allow concurrent homeporting of both Pacific and Atlantic Fleet EA-6B and F-14 to be tolerated, because they result in unusual economies of scale. However, because the F/A-18 community constitutes the largest portion of the Navy's strike/fighter aircraft arsenal, the complexity of its operational, training, and maintenance requirements preclude the possibility of collocating its Atlantic and Pacific Fleet assets.

Therefore, the Navy limited its initial screening analysis to the following 20 Navy and Marine Corps air installations located along the middle Atlantic coast and the Gulf of Mexico (see Figure 2.2-1):

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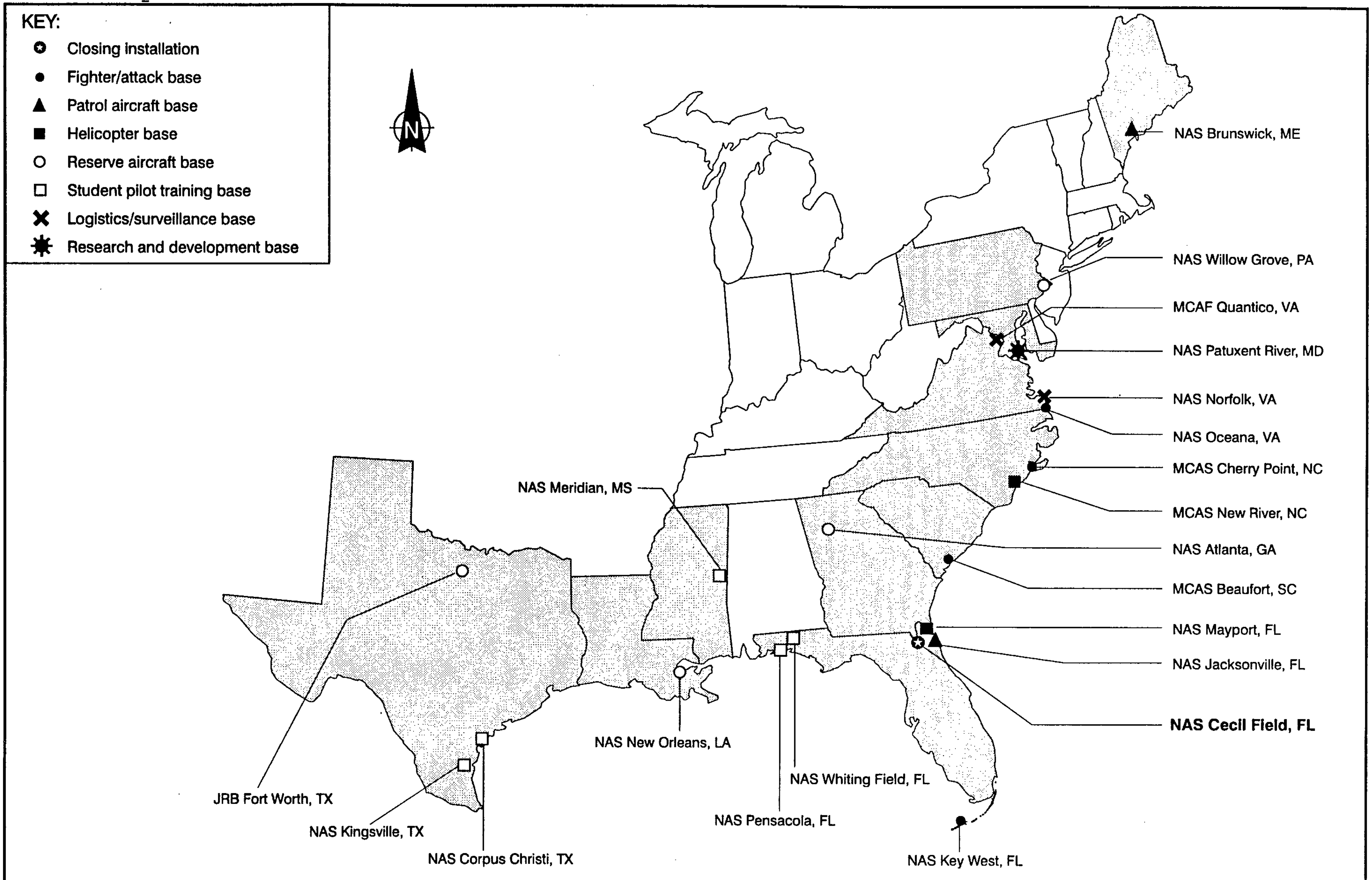

SOURCE: COMNAVAIRLANT 1996b

Figure 2.2-1 POTENTIAL RECEIVING INSTALLATIONS FOR F/A-18 AIRCRAFT

- **Maine:** NAS Brunswick;
- **Pennsylvania:** NAS Willow Grove;
- **Maryland:** NAS Patuxent River;
- **Virginia:** MCAF Quantico, NAS Norfolk, and NAS Oceana;
- **North Carolina:** MCAS Cherry Point and MCAS New River;
- **South Carolina:** MCAS Beaufort;
- **Georgia:** NAS Atlanta;
- **Florida:** NAS Whiting Field, NAS Pensacola, NAS Jacksonville, NAS Key West, and NAS Mayport;
- **Mississippi:** NAS Meridian;
- **Louisiana:** NAS New Orleans; and
- **Texas:** NAS Kingsville, NAS Corpus Christi, Joint Reserve Base (JRB) Fort Worth.

2.2.2 Capacity Analysis

The first stage in the screening process was to determine whether potential receiving sites had suitable existing capacity to accommodate F/A-18 aircraft from NAS Cecil Field. The 1995 BRAC Commission recommended that NAS Cecil Field assets be realigned to those Navy and Marine Corps Air Stations with the "necessary capacity and support infrastructure," language that was unique to realignments from Cecil Field. The DBCRA recognizes that some construction could be necessary at receiving installations and allows for that construction to be undertaken in order to effectuate the realignments. In light of both the DBCRA and the 1995 BRAC Commission recommendations for Cecil Field, the Navy drew two conclusions. First, the Navy concluded that some expansion of existing capacity could be reasonable in order to implement the realignment decision. Second, the Navy concluded that scenarios that require development of new capacity would not be considered reasonable should useable capacity exist elsewhere that supports the Navy's operational needs.

In considering what constituted necessary capacity, the Navy looked to the measures used by the BRAC Commission. As recognized during the 1995 BRAC process, available hangar space is a key indicator of excess capacity at each of the installations because it identifies how many aircraft can be supported through the use of existing facilities.

Specifically, hangar space limits the number of aircraft that can be maintained, parked, or maneuvered to conduct operations safely.

Aircraft hangar space is divided into "hangar modules" that support the operations and maintenance of individual aircraft squadrons. A hangar module consists of hangar dock, crew/equipment, and administrative space. P-80 (space requirement) guidelines for standard-size fleet squadrons are based on the number of aircraft in the squadron (i.e., 6 to 18 aircraft). Guidelines for nonstandard-size squadrons are based on the number of personnel assigned to the squadron. With fewer personnel assigned to the FRS, only a limited amount of hangar space is required. The 11 F/A-18 fleet squadrons to be relocated from NAS Cecil Field would require 11 hangar modules. The F/A-18 FRS is not a standard-size squadron because there are 48 aircraft assigned to it. In accordance with P-80 criteria, the F/A-18 FRS would require two hangar modules based on the number of personnel permanently assigned to the squadron. The number of available hangar modules is the most suitable indicator for assessing the maximum number of F/A-18 aircraft that can be realigned and supported by existing capacity and is the best measure of whether a potential receiving installation has capacity to absorb F/A-18 assets.

The capacity analysis was further refined by eliminating from consideration any installations with less than two modules of existing hangar capacity. This criterion furthers one of the basic operational considerations discussed in Section 2.1, specifically, maintaining the integrity of individual carrier airwings. Typically, two or three Navy F/A-18 squadrons are assigned to a wing. They deploy together as part of a carrier battle group's striking arm. Deployment, training, and maintenance schedule requirements are the same for squadrons within a carrier airwing. Because of this, at least one complete wing must be collocated for training, readiness, maintenance, command and control, and operational synergy associated with working and living together. The Navy views this criterion as crucial to combat readiness (COMNAVAIRLANT 1997).

Applying the capacity criterion outlined above to the installations listed in Section 2.2.1, the Navy eliminated all but the following seven candidate receiving installations:

- NAS Oceana;
- MCAS Cherry Point;
- NAS Pensacola;
- MCAS Beaufort;
- JRB Ft. Worth;

- NAS Key West;
- NAS Kingsville; and

A summary of the overall screening analysis is presented in Section 2.2.5.

2.2.3 Infrastructure Analysis

The second stage in the screening process involved examination of the infrastructure at each of the seven candidate receiving installations. This required identification of what constituted necessary infrastructure and whether the installations possessed the needed infrastructure. Both the F/A-18 fleet squadrons and the FRS will require an installation with:

- An airfield configuration able to support F/A-18 flight operations;
- F/A-18 training facilities;
- F/A-18 maintenance facilities; and
- Necessary ancillary facilities or the ability to economically create such facilities through the reuse of excess space in existing buildings or through reasonable levels of new construction.

The Navy identified distinct criteria for candidate installations. The components of these criteria are briefly discussed in the following sections.

2.2.3.1 Runway Safety

As established by the Naval Aviation Training and Operating Procedures Standardization (NATOPS) manual, F/A-18 aircraft require primary runways of at least 8,000 feet (2,424 meters) and secondary runways of at least 6,500 feet (1,970 meters) in order to safely operate the fleet squadrons and FRS. These minimum runway lengths are derived from a NATOPS requirement that an aircraft be able to abort its takeoff even after reaching aircraft rotation speed and still safely stop on the runway. In order to realign F/A-18 aircraft successfully, the candidate installation must be able to support projected operations. Specifically, its runways, taxiways, and other airfield components must accommodate F/A-18 operations.

At some airfields, secondary runways are often required for fleet and FRS operations because of crosswind limitations on the primary runway. The operations tempo associated with fleet and FRS operations and training syllabi are sufficiently high such that a second runway is considered a vital safety consideration for basing the fleet aircraft. The second runway is used to recover aircraft should the primary runway become unusable. Therefore, a

primary and secondary runway are essential. Parallel runways are preferred; however, multiple runway configurations (more than one acceptable runway, but not parallel) are acceptable (COMNAVAIRLANT 1997).

2.2.3.2 Training Infrastructure

Both the F/A-18 fleet squadrons and the FRS will require adequate training facilities at their receiving installation(s) or the ability to economically create such facilities through the reuse of existing space in existing buildings or through moderate levels of new construction. The largest single component of training infrastructure is the F/A-18 flight simulator, although other classroom facilities would also be needed for the FRS and the Naval Maintenance Training Group Detachment (NAMTRAGRUDET).

2.2.3.3 Maintenance Infrastructure

The AIMD is considered essential if three or more fleet squadrons or the FRS is permanently assigned to a base because of the Navy F/A-18 maintenance requirements (COMNAVAIRLANT 1997). Both the F/A-18 fleet squadrons and the FRS will require adequate maintenance facilities (i.e., aircraft intermediate maintenance department [AIMD] facilities) at their receiving installation(s) or the ability to economically create such facilities through the reuse of existing space in existing buildings or through moderate levels of new construction.

2.2.3.4 Ancillary Facility Infrastructure

Ancillary infrastructure, such as housing, recreational and personnel support facilities, minor modification to aircraft parking aprons, and similar upgrades, may be required to accommodate additional aircraft and personnel.

2.2.4 Operational Readiness Screening

The third stage of the screening process involved evaluation of receiving installations for the following operational readiness criteria:

- Proximity to suitable aircraft training ranges capable of supporting F/A-18 training syllabi;
- Ability to support Field Carrier Landing Practices (FCLPs) required for F/A-18 fleet squadrons and the FRS; and

- Ability to safely support F/A-18 operations in combination with other installation operations.

Specific details regarding these criteria and how they relate to the seven candidate receiving installations are discussed in the following sections.

2.2.4.1 Proximity to Suitable Training Ranges

F/A-18 fleet and FRS operations require that specific range parameters be met. Acceptable ranges possess a Tactical Aircrew Combat Training System (TACTS) and laser-safe targeting capabilities for air-to-air (A/A) and air-to-ground (A/G) training, respectively, and are located within 100 NM of the parent airfield. Each element of the criteria is explained briefly below.

TACTS is a system which provides for safety, efficiency, and effectiveness of training sessions through the use of a mission playback capability. Aircraft configured with a data transmission pod are continuously tracked, and their maneuvers, weapons delivery procedures, and flight data are available for perusal and recording by a ground monitoring station. These recorded data then can be used to aid in reconstruction and debriefing of large-scale or complex training sessions. Remote ground stations are used to collect the signals from aircraft in designated special use air space and send them to the central facility. The creation of new TACTS ranges is not feasible because of the process and lead time associated with establishing new special use airspace within the national airspace structure, the cost and lead time for procurement of TACTS equipment, and site acquisition/construction costs.

TACTS is crucial to adequate A/A training because TACTS makes possible not only the accurate reconstruction of complex aerial training engagements, but also the engagements themselves. These engagements include, among other things, weapons deliveries within acceptable launch envelopes, tracking of complex maneuvers, and simulation of enemy and friendly ground/air controlled intercept and control capabilities. They simulate real world scenarios likely to be encountered by a fighter aircrew. The aircrew's performance is reconstructed through use of the TACTS data which are used in detailed debriefs of training engagements. These training engagements provide invaluable learning points for the pilots: they can see, and be critiqued on, their performance in a real world level of detail. Without these reconstructions, these learning points would be lost, which in turn would result in a direct reduction in combat readiness and safety.

Additionally, because of the inherent dangers of simulated air combat, especially in large-scale or complex maneuvers involving aircraft on different radio frequencies, TACTS

provides an essential safety margin/monitoring capability. The inability to train on a TACTS-equipped range would also result in significant safety restrictions on the type of training discussed above or the outright elimination of this essential training should the safety risks be deemed unacceptable. The inability to train on a TACTS-equipped range means the aircrews will not be exposed to real world situations and will, therefore, not be adequately trained for real world aerial combat.

Similarly, A/G training for F/A-18s requires a range with laser-safe capability.

Because of its precision striking capability, the laser-guided bomb is the predominant weapon system for the majority of current targeting requirements. Aircrews must be able to practice the complex maneuvers necessary to conduct a successful attack. These maneuvers include determining acceptable attack parameters, target acquisition, weapons selection and aircraft positioning, and weapons delivery. These actual combat maneuvers use practice weapons guided by the same aircraft-borne or ground-based lasers that would be used with live ordnance. Laser-safe ranges also afford the ability to test and groom the actual laser targeting systems that would be used in combat.

Laser-safe range capability primarily involves creation and maintenance of extensive zones clear of any cultural development or environmental considerations that may be adversely affected by either direct or reflected laser radiation. This requires long-term, exclusive-use land areas to be acquired through costly lease or purchase of large land masses.

Proximity of the fleet squadrons and the FRS to training ranges is also crucial. Although distance to ranges has not always been important to basing decisions, the development and acceptance of the F/A-18 A/B/C/D series aircraft, with its short combat radius, as well as budgetary and maintenance constraints have resulted in the need to use range distance as a limiting factor. For the F/A-18 A/B/C/D aircraft, a typical A/A or A/G training sortie requires approximately 6,000 pounds (2,722 kilograms) of fuel per aircraft. In order for the aircraft to transit to and from the range, accomplish the training passes required for each sortie, and return to home base with the required safety margin of fuel without refueling, training ranges cannot be located farther than 100 NM (185 kilometers) from the home airfield. Utilizing ranges that are farther than 100 NM would require refueling to allow for timely completion of training syllabi or result in the need for additional sorties, which would increase the time and cost necessary to complete the training syllabi. In addition, utilizing ranges that are more than 100 NM from the primary air station places unnecessary demands on the F/A-18 A/B/C/D's limited airframe life and increases fuel consumption and maintenance costs. Thus, for new air station development or realignments under the DBCRA, the distance to acceptable ranges is a critical operational criterion.

The 100 NM limitation can be overcome where aircraft can refuel at a location close to the range. For example, on the west coast, aircraft operating out of NAS Lemoore use ranges more than 100 NM away. They conduct training sorties on the range and then refuel at NAS Fallon, an air station close to the range. After refueling, the aircraft conduct another training sortie on the range and return to NAS Lemoore. This procedure results in two training sorties, which offsets the additional fuel required. This refueling option does not exist on the east coast because, for those air stations that do not have an acceptable A/G range within 100 NM, the nearest A/G range which is otherwise acceptable does not possess a corresponding refueling capability. To utilize such ranges without being able to refuel would result in reduced training safety and a loss of training opportunities because of the increased time, maintenance, and flight hours necessary to achieve predeployment training. These lost training opportunities would directly translate to reduced combat readiness and warfighting capability.

2.2.4.2 Field Carrier Landing Practice (FCLP) Requirements

As part of their training programs, the F/A-18 fleet squadrons and the FRS are required to complete numerous FCLP operations during their refresher training or predeployment preparations. These landings are intended to familiarize the pilot with carrier landing approaches and are required to be accomplished at set times and under set conditions (e.g., at night). FCLPs result in heavy peak-use periods for an airfield, sometimes to the point of closing an airfield to other types of operations. For three squadrons, the average airfield use requirement during peak periods would equate to about 3.6 to 5.1 hours per day for FCLPs alone. For the FRS, average airfield use requirements during peak periods would equate to about 4.8 to 6.8 hours per day for FCLPs alone.

The congestion caused by the FRS or more than three fleet squadrons is normally relieved by conducting FCLPs at an outlying field (OLF) or auxiliary field (ALF), which are auxiliary airfields controlled by the primary airfield (e.g., NAS Oceana's Naval Auxiliary Landing Field [NALF] Fentress). In some circumstances, a parallel runway will suffice depending upon airfield use conditions. For example, based upon projections for MCAS Cherry Point and MCAS Beaufort, addition of more than three fleet squadrons or the FRS to these stations would result in a 40 to 45% increase in the peak hour operations. More significantly, these operations would need to be conducted at specific times in the deployment training cycle (e.g., no earlier than 10 days prior to a deployment or major at-sea training exercise) according to specific training requirements.

A related criterion is the distance of the OLF from the primary airfield. Fuel consumption rates for flights to and from the OLF, the FCLPs themselves, and the required safety margin dictate a distance of 50 NM (93 kilometers) as the maximum acceptable distance between primary airfield and OLF. Fifty NM is the maximum distance at which an F/A-18 can take off from its home airfield, complete all required training within the constraints of currently mandated syllabi, and return to its home airfield with the required amount of fuel remaining on board. Flying greater distances to an OLF would require the aircraft to either land and refuel (with resultant increases in time and maintenance costs) or conduct more flights to accomplish that required amount of training.

It should be noted that distances of 75 to 100 NM between a primary airfield and an OLF have been accepted in the past. When master jet bases were developed in the 1950s and 1960s, the distance between a primary airfield and an OLF was not considered a controlling operational criterion. Consequently, for some existing air stations, particularly on the west coast, the nearest OLF is often located between 75 and 100 NM away. In more recent years, however, the development and acceptance of the F/A-18 A/B/C/D series as well as budgetary and maintenance constraints have resulted in the acceptance of OLF distance as a limiting factor. This has not only become policy but has been carried out in practice for all but one location (i.e., NAS North Island, California). Currently, every other Naval air station at which U.S. Navy fighter and or attack aircraft are based possesses either dual parallel runways or an OLF. Utilizing an OLF that is more than 50 NM away from the primary air station places unnecessary demands on the limited airframe life and increases fuel consumption and maintenance costs. Additionally, utilizing such an OLF allows fewer FCLPs per training mission, thereby increasing the time required to complete FCLP training. Thus, for new air station development or realignments under the DBCRA, the distance to an OLF is a critical operational criterion for air stations without parallel runways capable of supporting FCLP training. As a result, it is unreasonable to accept a distance of greater than 50 NM between the OLF and its parent field for this action because of increased costs associated with distances over 50 NM.

2.2.4.3 Compatibility of F/A-18 Operations with Other Installation Airfield Operations

Locating fleet operational aviation units at the same site as student pilot training command units is not an accepted practice within the Navy. The Navy's aversion to this practice is driven by the inherent dangers and safety concerns associated with high-speed, tactical operations of experienced crews sharing the same airfield or airspace with slow-

moving student training aircraft with inexperienced crews. The Navy has historically recognized this danger and separated these activities. Consequently, only limited data exists on mishaps that have occurred as a result of this basic incompatibility. This limited data nevertheless indicates that there has been approximately one midair or near-midair collision between student trainer and fighter/attack aircraft per year since 1987 (COMNAVAIRLANT 1997). These midair incidents have occurred nationwide, notwithstanding the current practice of not permanently collocating training and fleet and FRS aircraft. It is therefore reasonable to conclude that placing such aircraft at the same site would result in a significant increase in such incidents.

NAS Pensacola has a primary mission of initial student flight officer training not training and deployment of fighter/attack aircraft. NAS Whiting Field, located to the north of NAS Pensacola, has a primary mission of initial student pilot training. Student pilots at NAS Whiting Field routinely utilize NAS Pensacola airspace. Therefore, stationing Atlantic Fleet F/A-18 aircraft in proximity to an intensive military student training region such as the NAS Pensacola/NAS Whiting Field area is considered unacceptable.

It should be noted that the operations of the F/A-18 FRS include some student pilot training activities, but these activities are not at all similar to the type of operations conducted by student pilot training commands. The FRS provides an intermediate training level for aviators that have graduated from student pilot training and refresher training for experienced aviators and crews. Basic aviation training conducted at student pilot training airfields is significantly different from training required for F/A-18 aircraft.

The Blue Angels, the Navy's premier flight demonstration squadron, are currently stationed at NAS Pensacola. The Blue Angels' operations periodically shut down the airfield and would curtail flexibility for F/A-18 aircraft training.

All of these factors, particularly the routine presence of student pilots at NAS Whiting Field, would create unacceptable safety and operational conflicts with FRS pilots. F/A-18 FRS operations could not be reasonably integrated into the NAS Pensacola/Whiting Field complex without major conflicts; therefore, it was eliminated as a candidate installation.

2.2.5 Summary of Screening Process Identifying Three Candidate Receiving Installations

Table 2.2-1 presents a summary of the Navy's various screening criteria for east coast installations that were considered as potential receiving sites for Atlantic Fleet F/A-18 fleet and FRS aircraft. Three installations met all required criteria and were identified as

Table 2.2-1
SUMMARY OF AIR INSTALLATION SCREENING

East Coast Air Stations	Excess Capacity of Two or More Hangar Modules	Infrastructure				Operational Readiness							
						Range				FCLP			Compatibility with Station Operations
						Distance (NM)		Acceptability (within 100 NM)					
		Runways	Meets Criteria	Simulators[a]	AIMD[a]	A/A	A/G	TACTS[d]	Laser-Safe[d]	Parallel Runway	OLF	Acceptability	
NAS Brunswick	No	Dual 8K	Yes	No	No	55	15	No	No	Yes	No	Yes	Yes
NAS Willow Grove	No	Single 8K	No	No	No	57	60	No	No	No	Yes	Yes	Yes
NAS Patuxent River	No	Multiple 5K/9.7K/1.8K	Yes	No	No	135	25	No	No	No	Yes	Yes	Yes
MCAF Quantico	No	Single 4.2K	No	No	No	90	120	Yes	No	No	No	No	Yes
NAS Norfolk	No	Single 8K	No	No	No	40	75	Yes	Yes	No	Yes	Yes	Yes
NAS Oceana[c]	Yes	Two dual 8K	Yes	No	No	40	60	Yes	Yes	Yes	Yes	Yes	Yes
MCAS Cherry Point[c]	Yes	Multiple 8.4K/8.9K	Yes	No	No	20	20	Yes	Yes	No	Yes	No[b,e]	Yes
MCAS New River	No	Multiple 5K	No	No	No	55	75	Yes	Yes	No	Yes	No[b]	Yes
MCAS Beaufort[c]	Yes	Multiple 12K/8K	Yes	Yes	Yes	60	75	Yes	Yes	No	No	No[e]	Yes
NAS Atlanta	No	Single 10K	No	No	No	25	95	No	No	No	No	No	Yes
NAS Pensacola	Yes	Multiple 7K dual 8K	Yes	No	No	40	35	Yes	Yes	Yes	Yes	Yes	No
NAS Whiting Field	No	Dual 6K	No	No	No	45	40	Yes	Yes	No	Yes	Yes	No
NAS Jacksonville	No	Multiple 8K/5K	No	No	No	40	75	Yes	Yes	No	Yes	Yes	Yes
NAS Mayport	No	Single 8K	No	No	No	30	80	Yes	Yes	No	Yes	Yes	Yes
NAS Key West	Yes	Multiple 10K/7K	Yes	No	No	10	112	Yes	No	No	No	No	Yes
NAS New Orleans	No	Multiple 8K/6K	No	No	No	90	90	Yes	Yes	No	No	No	Yes
NAS Meridian	No	Multiple 6K/dual 8K	Yes	No	No	165	37	No	No	Yes	Yes	Yes	No
NAS Kingsville	Yes	Two dual 8K	Yes	No	No	65	65	No	No	Yes	Yes	Yes	No
NAS Corpus Christi	No	Multiple 5K/8K	No	No	No	50	85	No	No	No	Yes	Yes	No
JRB Fort Worth	Yes	Single 12K	No	No	No	75	100	No	No	No	No	No	Yes

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Table 2.2-1 (Cont.)

[a] The existing simulator and AIMD assets currently at NAS Cecil Field would relocate with the majority of the F/A-18 squadrons. Because only one installation possessed the necessary AIMD and simulator capability to support F/A-18 squadrons if the available hangar modules were fully utilized, the absence of these facilities was not considered a reasonable basis to eliminate an installation from consideration.

[b] MCAS Cherry Point's OLF, MCALF Bogue, is undesirable because of the level and type of operations, specifically FCLPs, normally associated with F/A-18 squadrons.

[c] These installations met all required criteria and were identified as reasonable candidate installations for receiving F/A-18 fleet and FRS aircraft.

[d] To be acceptable for F/A-18 aircraft, A/A ranges require, at a minimum, a TACTS system, and A/G ranges require, at a minimum, laser-safe capability.

[e] MCAS Cherry Point and MCAS Beaufort require an OLF or parallel runway to support more than three fleet squadrons or the FRS.

Key:

A/A = Air-to-air.
A/G = Air-to-ground.
FRS = Fleet Replacement Squadron.
JRB = Joint Reserve Base.
MCAF = Marine Corps Air Facility.
MCAS = Marine Corps Air Station.
NA = Not applicable.
NAS = Naval Air Station.
NM = Nautical miles.
OLF = Outlying field.

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reasonable candidate installations for receiving F/A-18 fleet and FRS aircraft: NAS Oceana; MCAS Beaufort; and MCAS Cherry Point.

The first stage of the screening process was to determine if potential receiving sites had suitable existing capacity to accommodate Navy F/A-18 aircraft. This screening eliminated from consideration any installations with less than two modules of existing hangar capacity. Seven installations met this criterion.

The second stage of the screening process assessed infrastructure. This screening showed that six of the seven candidate receiving installations possessed sufficient airfield configurations to support additional squadrons. JRB Fort Worth did not meet the runway criterion for F/A-18 fleet squadron operations because it has neither parallel nor multiple runways. None of the seven candidate installations possess existing training or maintenance facilities for the F/A-18 FRS, and only MCAS Beaufort possesses limited excess and maintenance facilities for F/A-18 fleet squadrons. All candidate installations would require some ancillary facility construction. However, the DBCRA permits reasonable construction as necessary to implement realignments.

Operational readiness comprises the third stage of the screening process. Of the seven candidate installations, NAS Kingsville, JRB Fort Worth, and NAS Key West failed to meet minimum A/G and A/A combat training range requirements. NAS Kingsville has access to A/G and A/A ranges; however, the ranges do not have TACTS or laser-safe capability. NAS Key West did not have access to an acceptable A/G range within 100 NM of the station. JRB Fort Worth also did not have access to ranges that possess the requisite TACTS or laser-safe capability. For an airfield with the FRS or more than three fleet squadrons assigned, an OLF or an acceptable parallel runway becomes a necessity to avoid unreasonable curtailment of other installation missions.

2.2.6 Descriptions of Candidate Receiving Installations

2.2.6.1 NAS Oceana

NAS Oceana occupies 5,650 acres (2,288 hectares) in southeastern Virginia in the south Hampton Roads Region, specifically within the corporate limits of the City of Virginia Beach, located approximately 10 miles east of the City of Norfolk, Virginia (see Figures 2.2-2 and 2.2-3). The station is a Navy master jet base, with a primary mission of training and deployment for fighter and attack aircraft.

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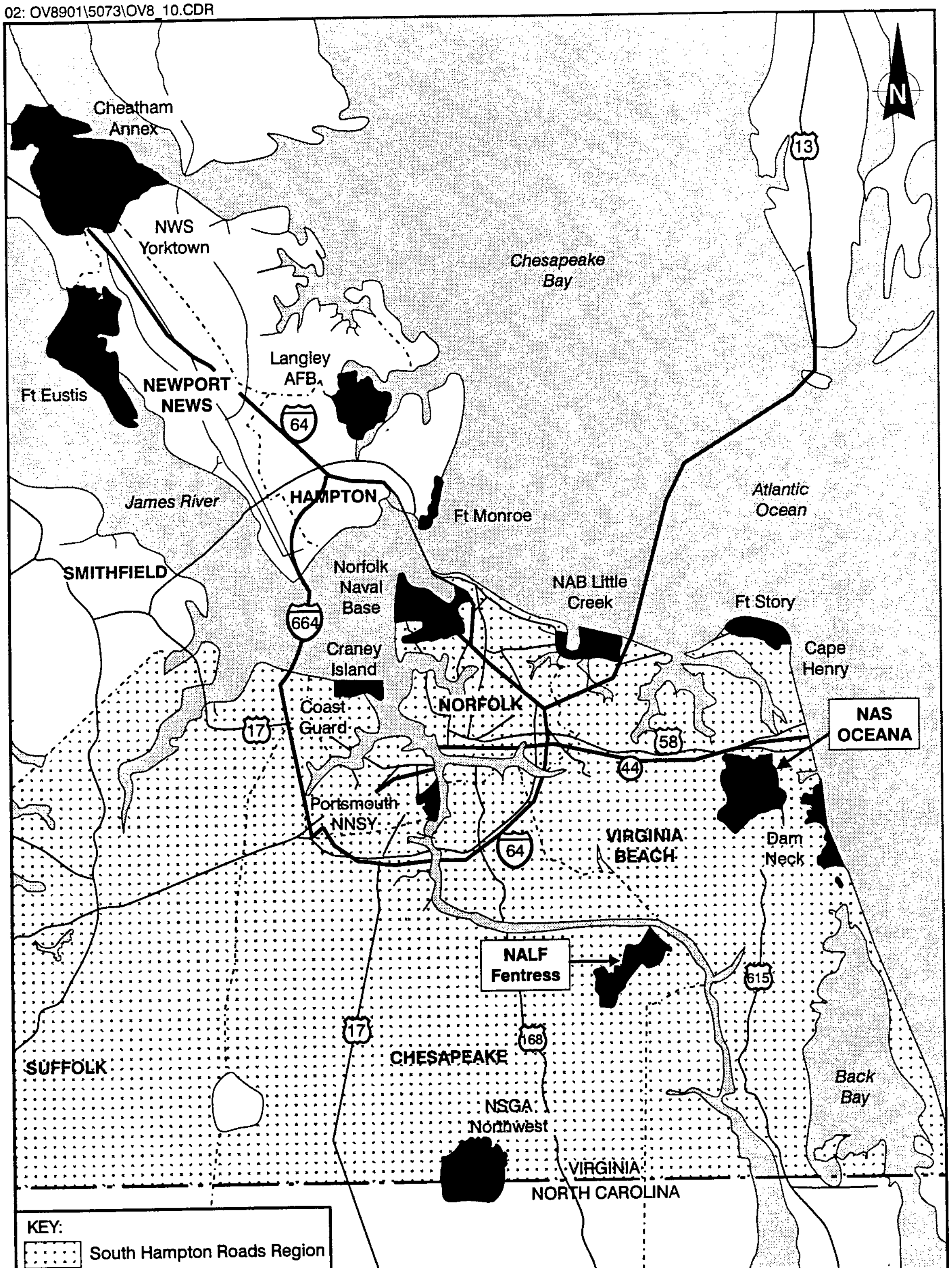

SOURCE: LANTDIV 1985.

NOT TO SCALE

Figure 2.2-2 NAS OCEANA REGIONAL LOCATION

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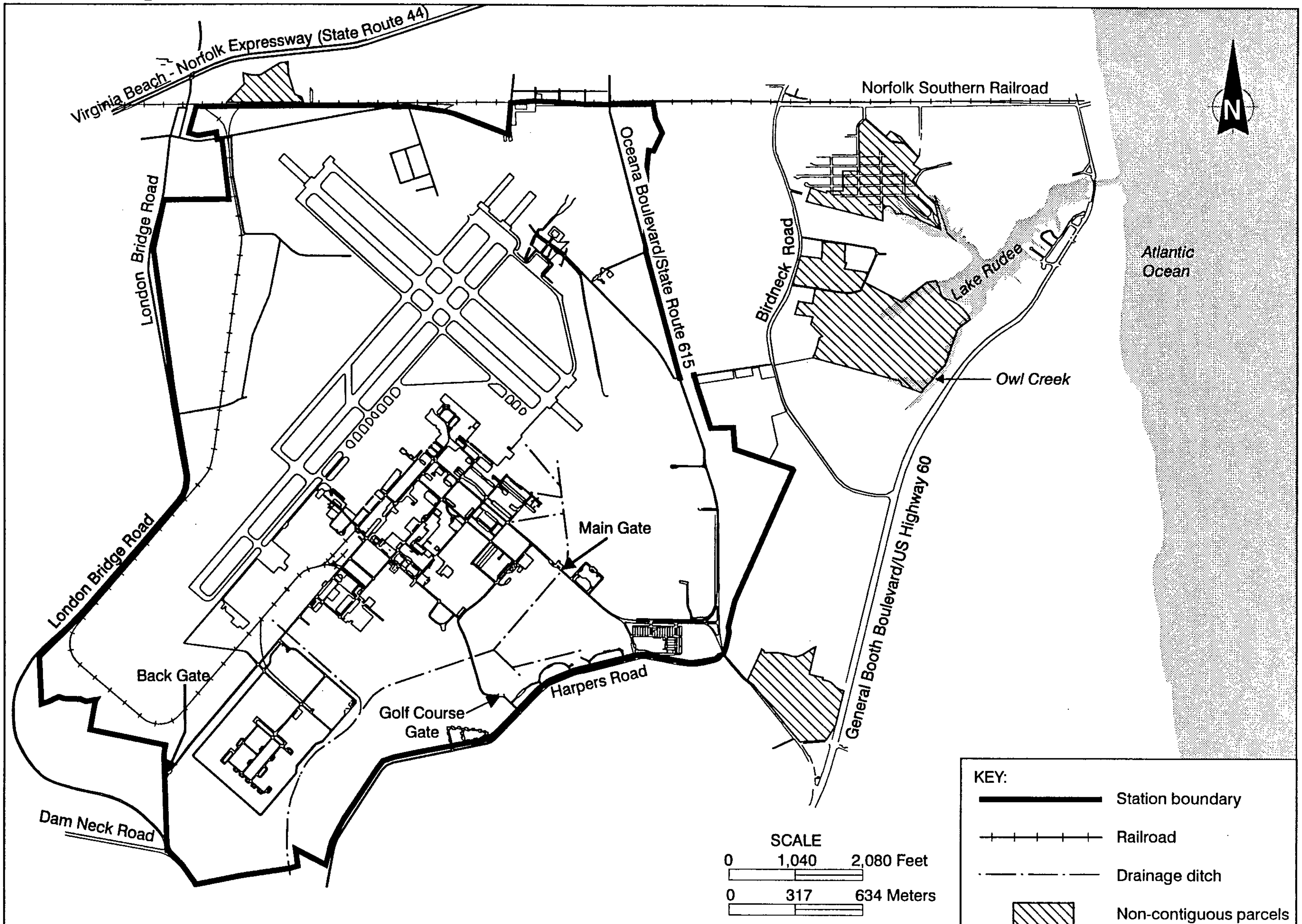

SOURCE: U.S. Navy 1995c

Figure 2.2-3 BASE MAP - NAS OCEANA

Capacity

NAS Oceana had been the Navy's primary site for Atlantic Fleet A-6 attack aircraft. However, the number of A-6 aircraft at NAS Oceana has gradually decreased since 1990, as this type of aircraft has been decommissioned from the Navy's active aircraft inventory. There are now no A-6 aircraft at NAS Oceana. This decommissioning has created excess capacity in existing facilities at the station, particularly in aircraft hangars and on aircraft parking aprons. Two entire hangars, Buildings 111 and 122, are available for reuse by F/A-18 squadrons (see Figure 2.2-4) (COMNAVAIRLANT 1996a). Using NAVFAC P-80 planning guidelines, there would be enough hangar capacity to accommodate eight F/A-18 fleet squadrons or six fleet squadrons and the FRS. With regard to parking apron capacity, NAS Oceana would be able to support eight F/A-18 fleet squadrons or four fleet squadrons and the FRS.

Maintenance Facilities

NAS Oceana has no existing dedicated AIMD facilities equipped to maintain F/A-18 aircraft. The decommissioning of A-6 aircraft at the station has created excess space that could accommodate the various components of F/A-18 maintenance equipment and activities. New construction required to support F/A-18 aircraft would include relatively small additions and interior modifications to existing maintenance facilities, the construction of freestanding storage buildings, an aircraft acoustical enclosure for in-aircraft engine testing, a new corrosion control hangar, and replacement of a jet engine test cell facility.

Training Facilities

There are no existing facilities at NAS Oceana for training of personnel specifically in the deployment and maintenance of F/A-18 aircraft. However, as with maintenance facilities, the decommissioning of A-6 aircraft has created excess capacity in existing facilities. Some of this excess capacity would accommodate reuse with little modification (e.g., classroom facilities), but others would require more extensive new construction, primarily to accommodate flight simulator equipment.

Field Carrier Landing Practice Facilities

NAS Oceana operates NALF Fentress, an OLF that is specifically designed, configured, and equipped for FCLPs required by carrier-based aircraft. It also has an 8,000-foot runway that is long enough to accommodate FRS training and safety requirements. The

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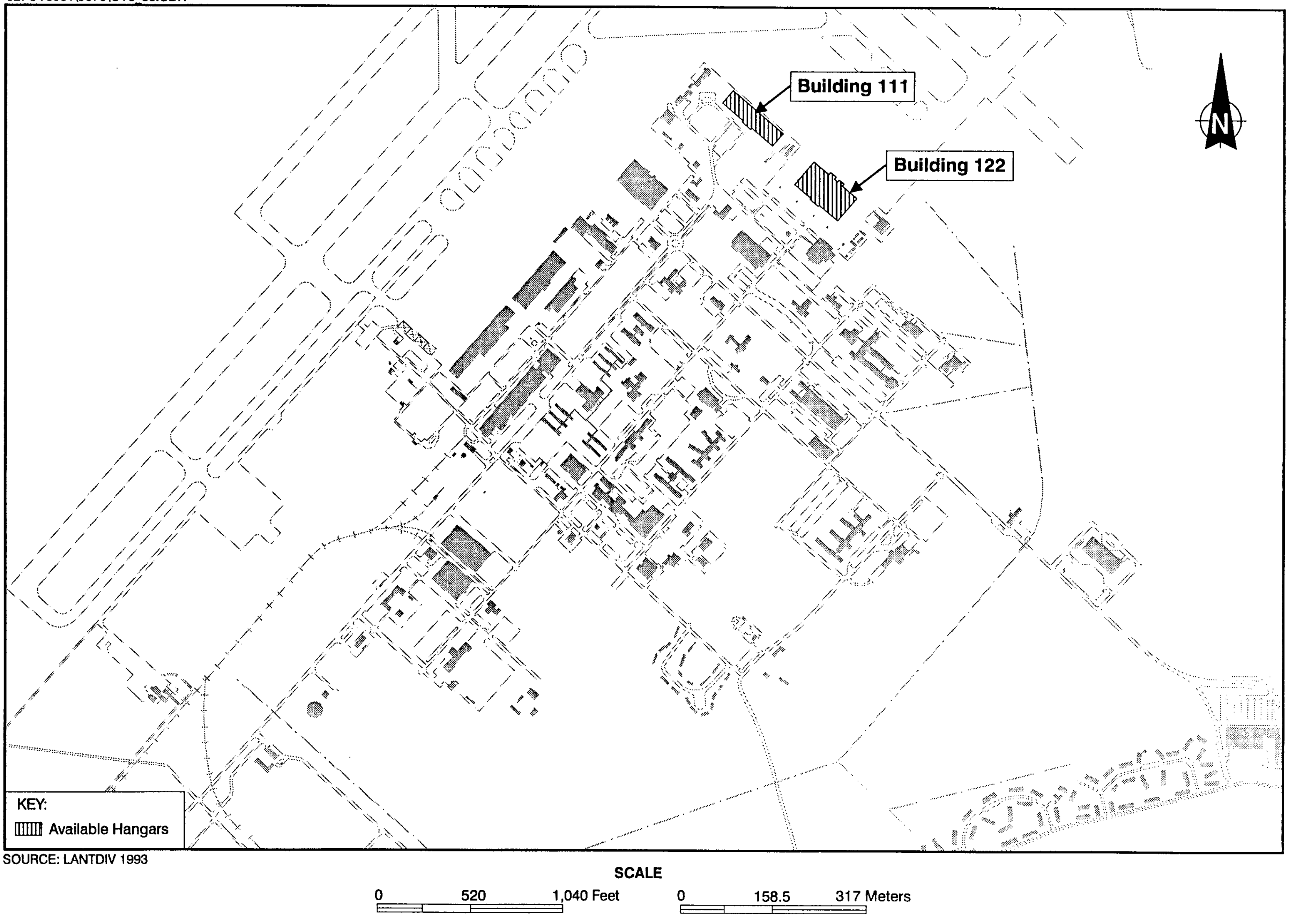

SOURCE: LANTDIV 1993

Figure 2.2-4 AVAILABLE HANGARS AT NAS OCEANA

runway and airspace loading can accommodate the operations of all F/A-18 FCLPs without impeding its operational efficiency.

Personnel Support Facilities

On-base bachelor enlisted quarters (BEQ) and parking facilities would need to be supplemented to accommodate all or the majority of F/A-18 assets at NAS Oceana. This could be accomplished through the construction of a BEQ. This project would address deficiencies in BEQ facilities at the station (see Section 2.4.1.1). Existing family housing and recreational facilities at the station and in the region would be sufficient to accommodate all F/A-18 assets.

2.2.6.2 MCAS Beaufort

MCAS Beaufort is located in the southeastern portion of South Carolina, occupying approximately 5,800 acres (2,320 hectares) near the City of Beaufort (see Figures 2.2-5 and 2.2-6). The station is a Marine Corps jet base with a primary mission of supporting the operations of Marine F/A-18 fighter/attack aircraft.

Capacity

Based on the current MCAS Beaufort airfield configuration and usage, portions of two existing hangars are available for reuse by Navy F/A-18 aircraft, specifically Buildings 414 (one of these two modules is available) and 728 (one module is available) (see Figure 2.2-7) (LANTDIV 1996b). This excess space would accommodate two F/A-18 fleet squadrons (LANTDIV 1996b).

With regard to aircraft parking apron spaces, there is available capacity to park two fleet squadrons of F/A-18 aircraft at MCAS Beaufort. However, it should be noted that parking these aircraft would require slight deviations from NAVFAC P-80 planning guidelines; specifically, the required peripheral taxiway would not meet minimum width criteria (LANTDIV 1996b).

Maintenance Facilities

AIMD activities at MCAS Beaufort are assigned to Marine Aircraft Logistical Squadron (MALS)-31. Currently, MALS-31 performs maintenance for seven Marine F/A-18 squadrons. There is excess capacity to conduct maintenance on Navy F/A-18 aircraft (LANTDIV 1996b). Most of the MALS-31 equipment is deployed as mobile facilities.

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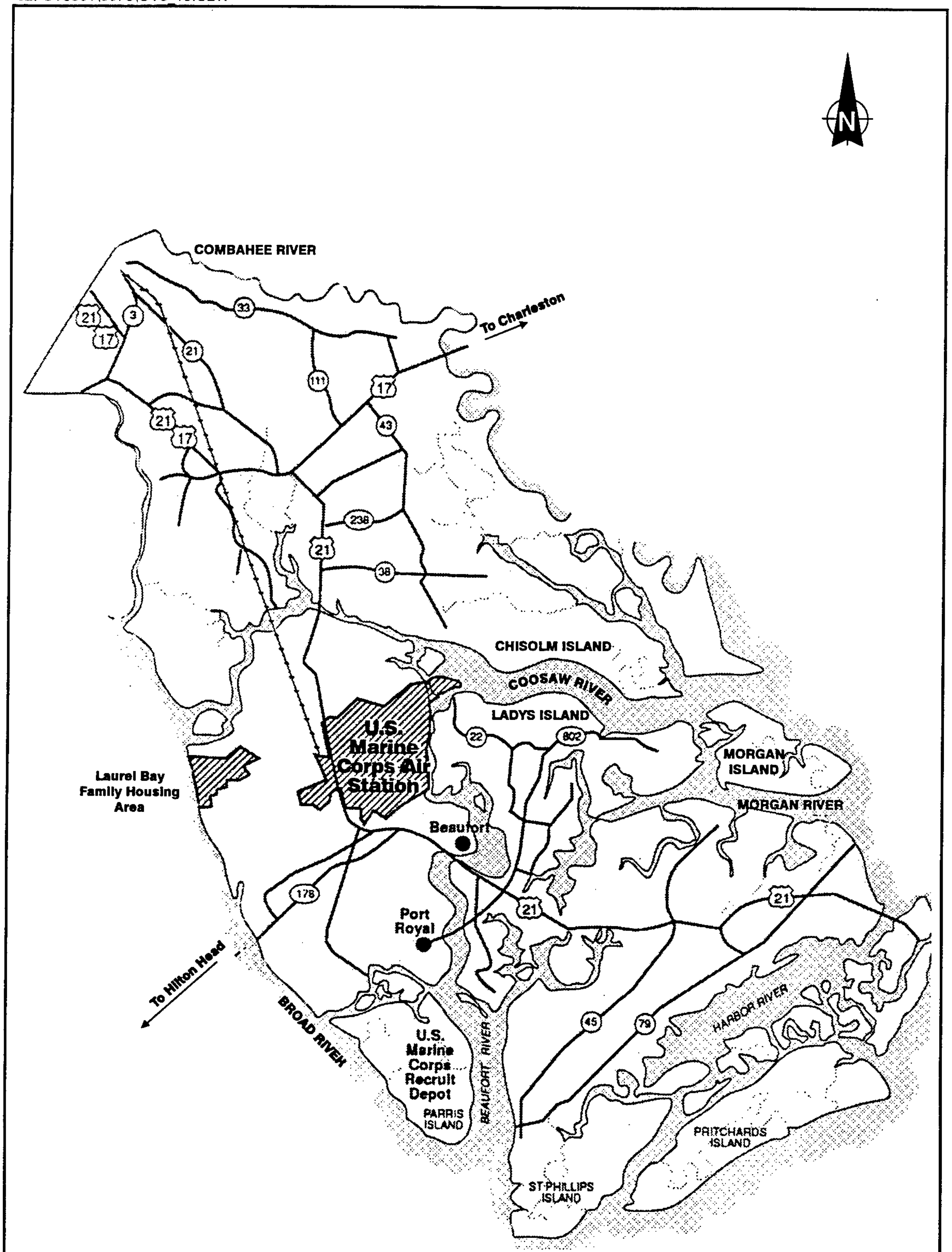

SOURCE: SOUTHDIV 1994

NOT TO SCALE

Figure 2.2-5 REGIONAL LOCATION - MCAS BEAUFORT

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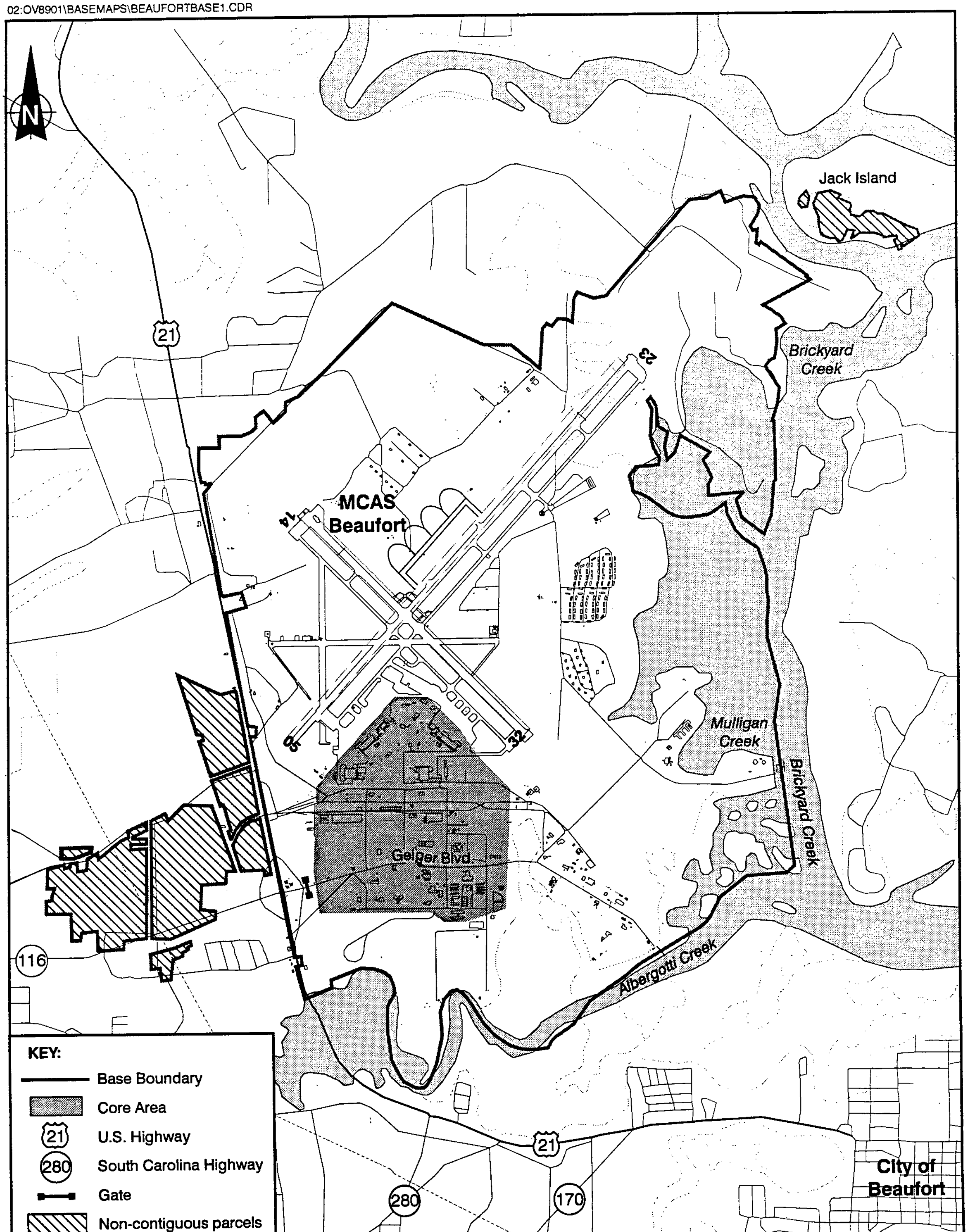

SOURCE: SOUTHDIV 1994

SCALE
0 1,075 2,150 Meters
0 3,527 7,054 Feet

Figure 2.2-6 BASE MAP - MCAS BEAUFORT

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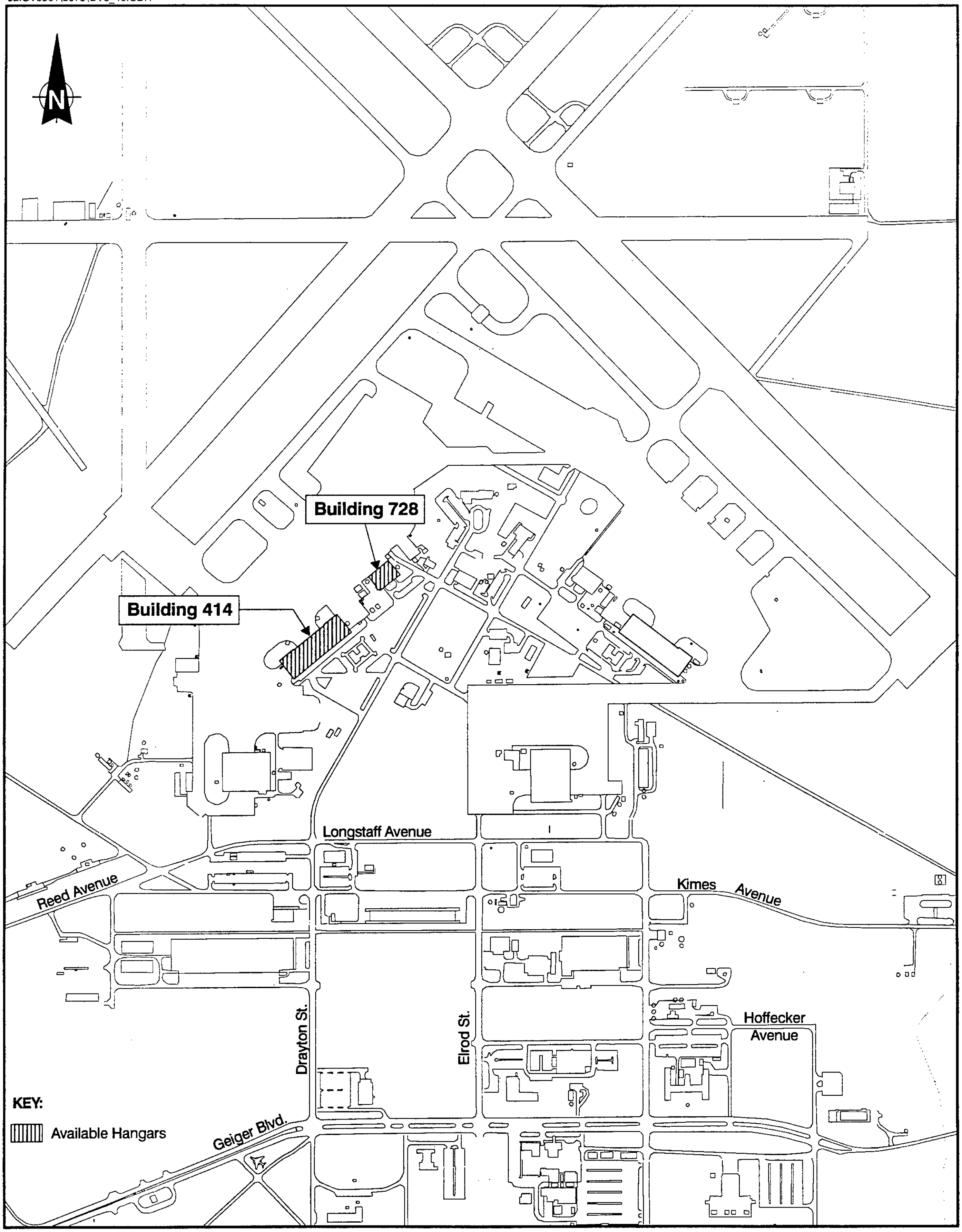

SOURCE: LANTDIV 1996b.

Figure 2.2-7 AVAILABLE HANGARS AT MCAS BEAUFORT

However, these facilities are considered adequate for up to two fleet squadrons (LANTDIV 1996b). The addition of three or more squadrons would require the development of a separate AIMD facility to support Navy squadrons assigned to MCAS Beaufort.

Training Facilities

There are existing F/A-18 training facilities at MCAS Beaufort; however, they are fully utilized by the Marine Corps F/A-18 aircraft. If two squadrons are transferred to MCAS Beaufort, training would be conducted at NAS Oceana. Relocation of more than two fleet squadrons to MCAS Beaufort would require additional training functions. An expansion of the existing facility would be required.

Field Carrier Landing Practice Facilities

MCAS Beaufort does not operate its own OLF. However, FCLP training requirements associated with two fleet squadrons of Navy F/A-18 aircraft could be supported at the station's main airfield facilities. Relocation of more than three fleet squadrons to the station would require the construction of a new parallel runway.

Personnel Support Facilities

There is sufficient capacity in existing facilities to accommodate personnel associated with the realignment of up to two F/A-18 fleet squadrons to the station. For realignment of more than two squadrons, additional personnel support facilities would be required.

2.2.6.3 MCAS Cherry Point

MCAS Cherry Point is located in eastern North Carolina, occupying approximately 11,600 acres (4,640 hectares) in the City of Havelock (see Figures 2.2-8 and 2.2-9). The station is a Marine Corps master jet base. Its primary mission is to support deployment of Marine Corps attack aircraft, specifically AV-8 Harriers. It also supports deployment of Marine Corps cargo/transport aircraft, such as KC-130, C-9 and C-12 aircraft; and electronics aircraft, specifically EA-6B Prowlers. The station is designated as an aerial port of embarkation (APOE). Approximately 11,000 military operations are conducted per year in support of this mission requirement.

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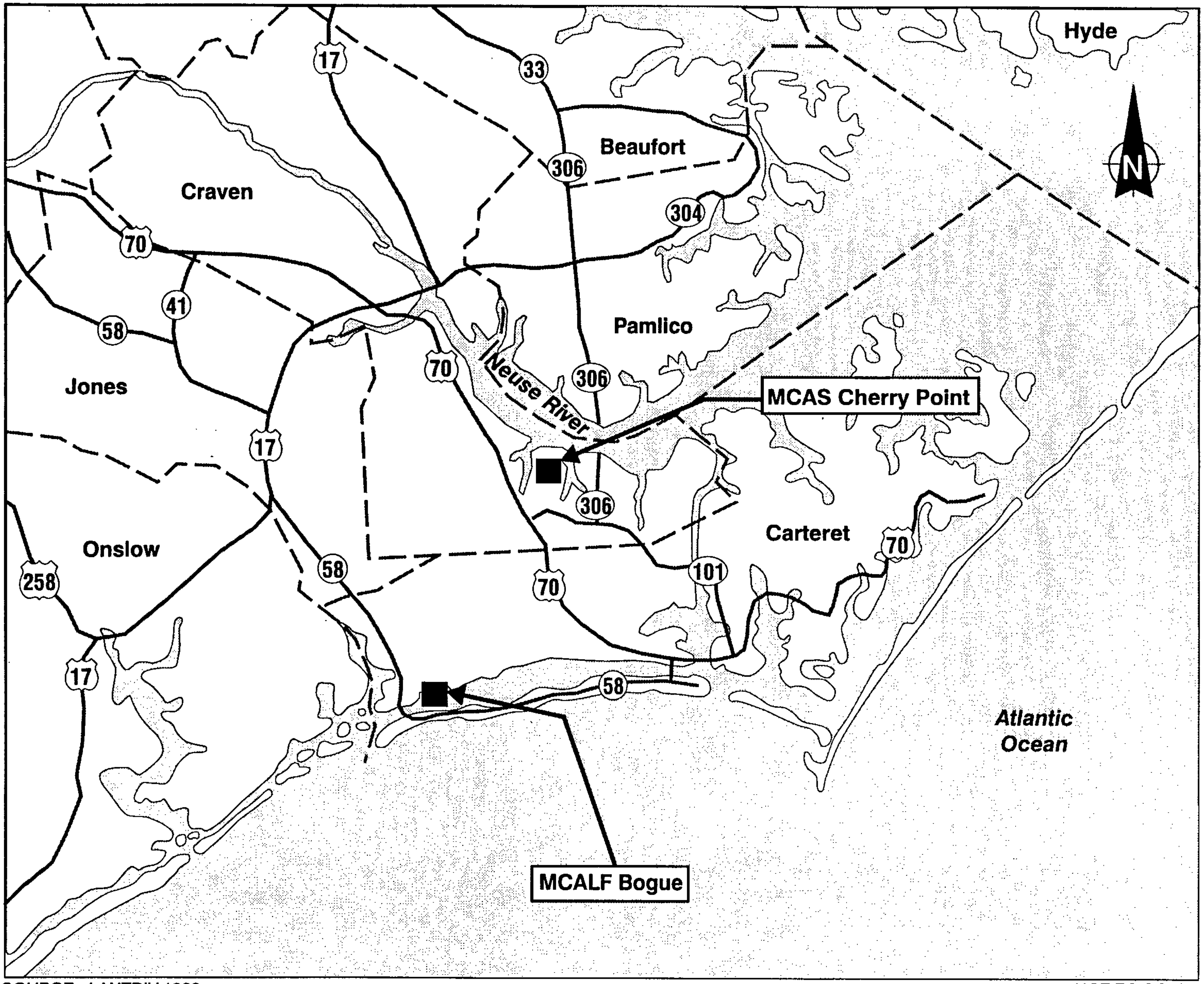

SOURCE: LANTDIV 1988.

NOT TO SCALE

Figure 2.2-8 REGIONAL LOCATION MCAS CHERRY POINT

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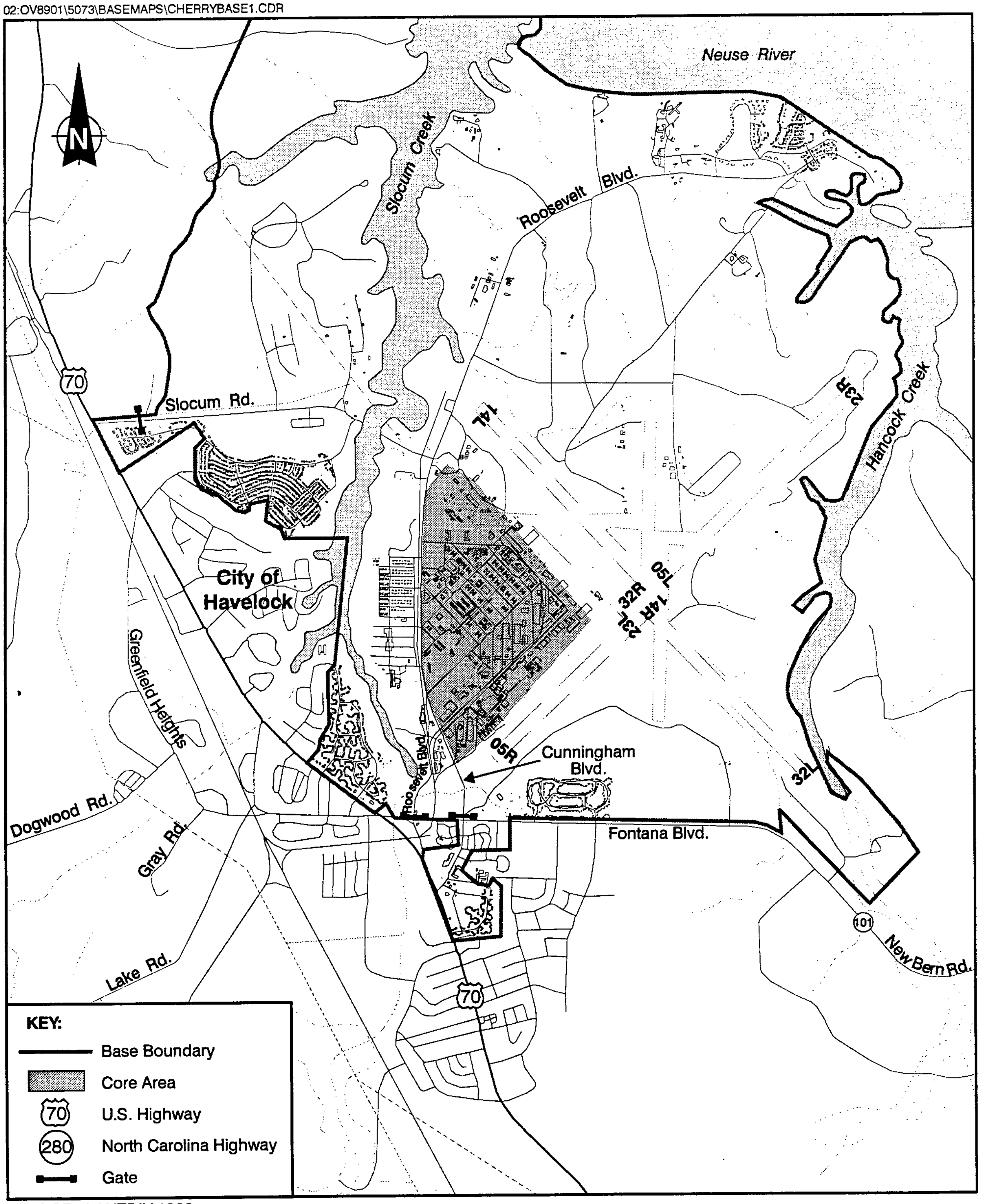

SOURCE: LANTDIV 1993

SCALE

0 1,183 2,366 Meters

0 3,881 7,762 Feet

Figure 2.2-9 BASE MAP - MCAS CHERRY POINT

Capacity

Based on the current MCAS Cherry Point airfield configuration, portions of three existing hangars are available for reuse by F/A-18 aircraft, specifically Buildings 1665W (one of two modules is available), 131S (one of two modules is available), and 1700 (two of two modules are available; however, because of the lack of administrative space, only one squadron can be accommodated) (see Figure 2.2-10) (LANTDIV 1996a). With minor renovations to satisfy F/A-18 space requirements, each of these hangars would be able to accommodate one F/A-18 fleet squadron, for a total of three fleet squadrons (LANTDIV 1996a).

With regard to aircraft parking apron spaces, there is available capacity to park three fleet squadrons of F/A-18 aircraft at MCAS Cherry Point. However, it should be noted that similar to MCAS Beaufort, parking these aircraft adjacent to assigned hangars would require slight deviations from NAVFAC P-80 planning guidelines; specifically, the peripheral taxiway would not meet minimum width criteria (LANTDIV 1996a). Notwithstanding this minor deviation from P-80 planning guidelines, there would be sufficient available aircraft parking capacity for up to four fleet squadrons (LANTDIV 1996a).

Maintenance Facilities

AIMD activities at MCAS Cherry Point are assigned to MALS-14. However, there is no F/A-18 repair capability at MCAS Cherry Point (LANTDIV 1996a). Therefore, a stand-alone F/A-18 AIMD facility would be required to support the realignment of three or more Navy F/A-18 fleet squadrons to this station (COMNAVAIRLANT 1997). An AIMD would consist of shops to conduct maintenance on F/A-18 airframes, armaments, engines, avionics systems, as well as shops and storage for ground support equipment (GSE).

Training Facilities

There are no F/A-18 training facilities at MCAS Cherry Point. However, because of the proximity of MCAS Cherry Point to NAS Oceana, F/A-18 maintenance training facilities could be established at NAS Oceana for use by Atlantic Fleet aircraft personnel stationed at MCAS Cherry Point (LANTDIV 1996a). Squadron pilot training facilities do not exist at MCAS Cherry Point. Squadron pilot training for up to four operational squadrons can be accommodated by utilizing planned Tactical Operational Flight Trainers (TOFTS) at NAS Oceana. To accommodate pilot training for five or more operational squadrons at MCAS Cherry Point, a TOFT would be required.

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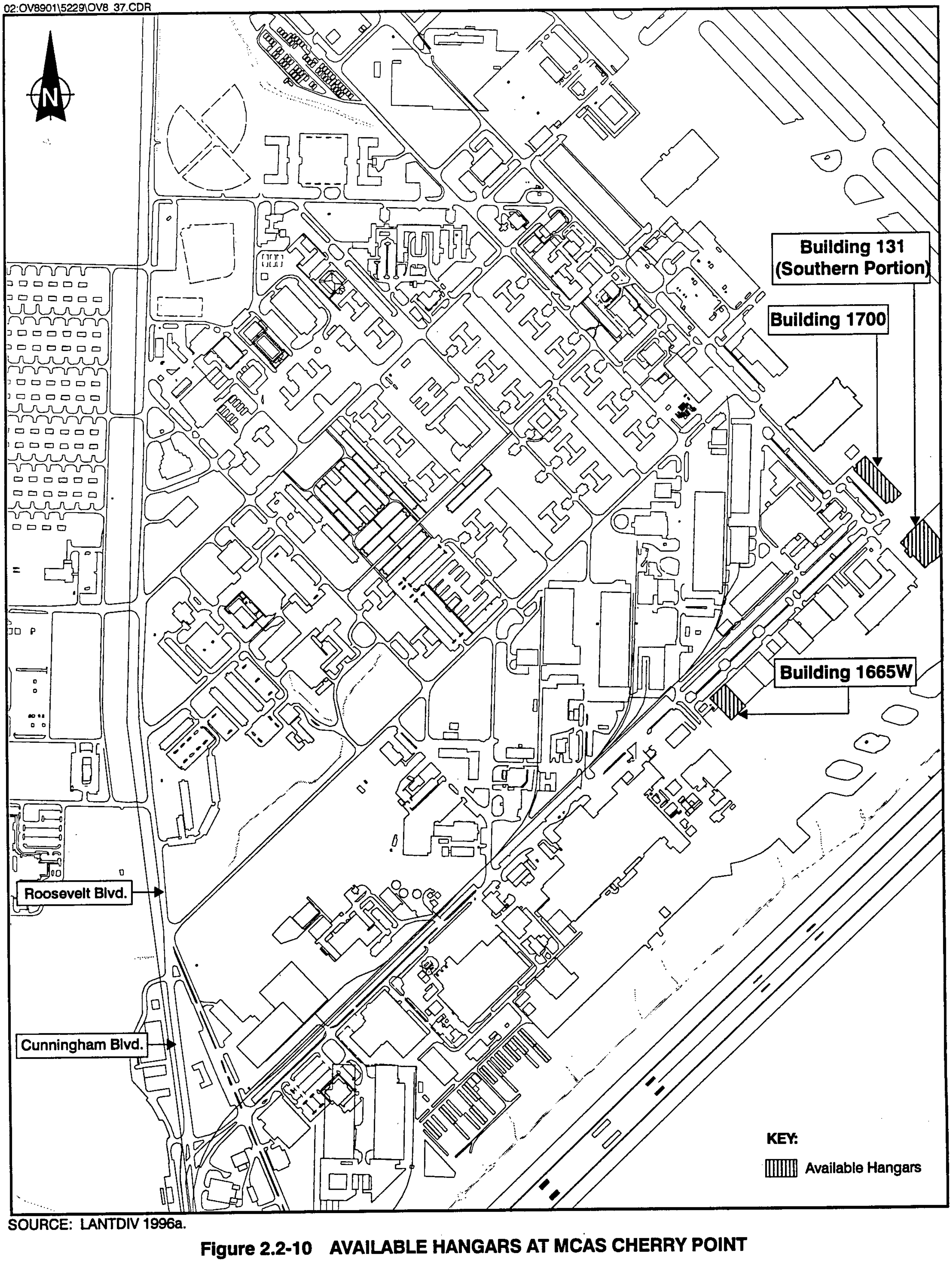


SOURCE: LANTDIV 1996a.

Figure 2.2-10 AVAILABLE HANGARS AT MCAS CHERRY POINT

Field Carrier Landing Practice Facilities

MCAS Cherry Point has an ALF, Marine Corps Auxiliary Landing Field (MCALF) Bogue. The runway at MCALF Bogue is only 4,010 feet (1,215 meters) and was specifically designed to simulate a Marine Corps expeditionary airfield. It is constructed with AM-2 matting, which would be used in a forward deployed situation to quickly establish a minimally capable runway in combat situations. These characteristics make MCALF Bogue undesirable for the level and type of operations, specifically FCLPs, normally associated with Navy F/A-18 fleet squadrons.

FCLP training requirements for up to three F/A-18 fleet squadrons can be supported at MCAS Cherry Point's primary runway. Relocation of more than three fleet squadrons to MCAS Cherry Point would impede airfield operations during peak periods and adversely affect the station's ability to support other necessary flight operations. Therefore, relocation of more than three fleet squadrons to MCAS Cherry Point would require the construction of a parallel runway.

Personnel Support Facilities

There is sufficient capacity in existing facilities to accommodate personnel associated with the realignment of up to four F/A-18 fleet squadrons to the station.

2.3 Development of Alternative Realignment Scenarios

Development of specific ARSs required the consideration of 1995 BRAC goals and objectives, and the capacity, infrastructure, and key F/A-18 operational factors.

As discussed in Section 2.2, the 11 F/A-18 fleet squadrons to be relocated from NAS Cecil Field will require 11 hangar modules. The F/A-18 FRS is considered to require the equivalent of two fleet squadrons, or two hangar modules. Therefore, without considering periodic deployment of squadrons, 13 hangar modules would be required under P-80 guidelines to house all F/A-18 aircraft from NAS Cecil Field.

Deployment schedules would have some impact on these requirements. A minimum of one carrier air wing (i.e., two or three F/A-18 fleet squadrons) will always be deployed. Therefore, if the aircraft were all relocated to one installation, the maximum amount of hangar capacity needed at any one time would be 11 modules (i.e., 13 modules minus 2 modules for deployed squadrons). Relocating the aircraft to two installations would require a total hangar capacity of 13 modules, because aircraft stationed at two separate installations could not share facilities.

Of the three candidate installations identified in Section 2.2, NAS Oceana has the greatest amount of excess hangar capacity (8 modules), followed by MCAS Cherry Point (3 modules), and MCAS Beaufort (2 modules). Therefore, it is apparent that no single-site or dual-site scenario could be created that would result in a complete adherence to P-80 guidelines (i.e., 11 or 13 modules, respectively). Some additional construction to expand hangar capacity and supporting infrastructure would be required for any ARS. Accordingly, each ARS includes construction necessary to bring it into compliance with P-80 guidelines.

Taking into account these issues, the following three ARSs were developed:

- **ARS 1:** Relocating all 11 F/A-18 fleet squadrons and the FRS to NAS Oceana.
- **ARS 2:** Relocating 2 F/A-18 fleet squadrons to MCAS Beaufort and 9 fleet squadrons and the FRS to NAS Oceana.
- **ARS 3:** Relocating 3 fleet squadrons to MCAS Cherry Point and 8 fleet squadrons and the FRS to NAS Oceana.

During the development of these ARSs, it became apparent that relocating the F/A-18 aircraft to NAS Oceana would result in significant aircraft noise impacts associated with the large increase in airfield operations. Accordingly, the Navy decided to consider other operationally feasible scenarios to reduce noise impacts. These scenarios would involve the

transfer of additional F/A-18 fleet squadrons to either MCAS Beaufort or MCAS Cherry Point.

- **ARS 4:** Relocating five F/A-18 fleet squadrons to MCAS Beaufort and six fleet squadrons and the FRS to NAS Oceana.

- **ARS 5**: Relocating five F/A-18 fleet squadrons to MCAS Cherry Point and six fleet squadrons and the FRS to NAS Oceana.

As has been noted, no ARS would meet P-80 guidelines without some additional construction. While the 1995 BRAC mandates are intended to maximize use of existing resources and minimize creation of new facilities, the most efficient use of existing resources would still necessitate some additional construction regardless of where the F/A-18 aircraft are relocated. It should be noted that by adding alternatives that place five F/A-18 fleet squadrons at MCAS Beaufort or MCAS Cherry Point, the capacity of NAS Oceana, defined by P-80 as eight hangar modules, would be fully utilized by the remaining six fleet squadrons and the FRS. MCAS Beaufort and MCAS Cherry Point each possess some available unused hangar capacity and are otherwise acceptable as receiving sites. Additional construction at either of these sites would allow capacity at NAS Oceana to be fully utilized, would use existing capacity at one of the two Marine Corps air stations, and would result in the most noise mitigation possible, consistent with operational requirements. Therefore, additional hangar module construction at MCAS Beaufort or MCAS Cherry Point is considered reasonable in the context of providing an alternative that mitigates noise impacts at NAS Oceana.

Conversely, major expansion at an installation not already having some existing capacity or requiring acquisition of real estate and construction of additional infrastructure would be unreasonable as long as other installations exist that could provide the infrastructure without degrading operational requirements.

2.3.1 Alternative Realignment Scenario 1: Transferring 11 F/A-18 Fleet Squadrons and the F/A-18 FRS to NAS Oceana

ARS 1 is the Navy's preferred alternative. From an operational perspective, it is clear that the best configuration of the Atlantic Fleet F/A-18 strike/fighter wing would result from relocating all the F/A-18 fleet squadrons and the FRS at a single installation (COMNAVAIRLANT 1997). Reasons for this include:

- Training efficiency through interaction among F/A-18 squadrons and elimination of either the costs of transporting trainees to a remote training location or constructing flight simulator facilities at multiple locations;

- Maintenance efficiency through elimination of the need for multiple spare part/equipment stocks or turnaround times necessary to get parts to and from a single repair site; and

- Personnel efficiency by eliminating the duplication in personnel inherent to siting aircraft in multiple locations.

Accordingly, a single-site alternative was developed as ARS 1. The three candidate receiving installations were examined to determine if all F/A-18 aircraft could be relocated within the parameters of the 1995 BRAC mandate. In doing so, adjustments were made to projected needs considering typical deployment schedules. As discussed above, hangar space occupied by deployed squadrons would be used by squadrons remaining at the installation (typically referred to as "hot racking"). Such hangar module utilization practices are normal at most Naval and Marine Corps air stations.

Even with adjustments for deployments, none of the three installations would be able to house all F/A-18 fleet and FRS aircraft to P-80 guidelines. Given the need for 11 available hangar modules in place at any one time and the operational preference for a single site, NAS Oceana is the only reasonable single-site location due to its available capacity and the relative costs involved. With the creation of an additional three-module hangar and aircraft parking apron, NAS Oceana could house all the F/A-18 aircraft to P-80 guidelines.

Single-siting would not be possible at either MCAS Beaufort or MCAS Cherry Point, even with an additional three-module hangar. MCAS Beaufort would still be deficient by six modules; MCAS Cherry Point would still be deficient by five modules; and NAS Oceana's capacity would remain underutilized.

Historic operating practices at NAS Oceana indicate that 11 squadrons could be accommodated, although at somewhat less than P-80 guidelines, even without construction of additional hangars and aircraft parking. Eleven squadrons could not be accommodated at MCAS Cherry Point or MCAS Beaufort without significant additional construction. Thus, NAS Oceana is the only reasonable location for a single-site scenario among the three candidate installations. This issue is further discussed in Sections 2.6.2 and 2.6.3.

2.3.2 Alternative Realignment Scenario 2: Transferring Two F/A-18 Fleet Squadrons to MCAS Beaufort and Transferring Nine F/A-18 Fleet Squadrons and the F/A-18 FRS to NAS Oceana

This alternative would maximize the use of existing hangar and apron capacity at MCAS Beaufort and sends the remaining F/A-18 assets, including the FRS, to NAS Oceana. It would have the added advantage of collocating the Navy and Marine Corps F/A-18 squadrons, which comprise one carrier airwing, at MCAS Beaufort. Although there is excess capacity using P-80 guidelines for two fleet squadrons at MCAS Beaufort, slight deviations from P-80 guidelines would be required to accommodate aircraft on the station's parking apron. However, overall airfield efficiency would be maintained.

While this scenario would seem to mitigate the hangar module deficiency at Oceana, it would still result in the same capacity deficiency at NAS Oceana as ARS 1 (i.e., a three-module deficiency) for periods when the MCAS Beaufort carrier air wing would be deployed (i.e., approximately 20% of deployment schedules). Construction of a three-module hangar would still be required at NAS Oceana.

Two fleet squadrons can be absorbed at MCAS Beaufort without any significant aircraft maintenance facility (i.e., AIMD) expansions, because there are available Marine Corps mobile AIMD facilities that can support the two additional squadrons. Because of maintenance requirements, relocating more than two F/A-18 fleet squadrons at MCAS Beaufort would require the construction of an AIMD and new hangar modules (COMNAVAIRLANT 1996a).

2.3.3 Alternative Realignment Scenario 3: Transferring Three F/A-18 Fleet Squadrons to MCAS Cherry Point and Transferring Eight F/A-18 Fleet Squadrons and the F/A-18 FRS to NAS Oceana

This alternative would maximize the use of excess hangar and apron capacity at MCAS Cherry Point by sending one three-squadron carrier airwing to MCAS Cherry Point and the remaining F/A-18 assets, including the FRS, to NAS Oceana. As with ARS 2, accommodating three squadrons at MCAS Cherry Point would require deviations from P-80 guidelines with regard to parking apron requirements; however, these deviations would not significantly affect airfield efficiency.

This scenario would reduce the hangar module deficiency at NAS Oceana compared to ARS 1 or 2. NAS Oceana would be deficient by only two modules for periods when the MCAS Cherry Point fleet squadrons would be deployed (i.e. approximately 20% of deployment schedules). Construction of a two-module hangar would be required at NAS Oceana.

AIMD activities at MCAS Cherry Point are assigned to Marine Aircraft Logistical Squadron (MALS)-14. Currently, there is no F/A-18 repair capability at MCAS Cherry Point (LANTDIV 1996a). Therefore, a stand-alone F/A-18 AIMD facility would be required to support the realignment of three fleet squadrons of Navy F/A-18 aircraft to this station (COMNAVAIRLANT 1997).

2.3.4 Alternative Realignment Scenario 4: Transferring Five F/A-18 Fleet Squadrons to MCAS Beaufort and Transferring Six F/A-18 Fleet Squadrons and the F/A-18 FRS to NAS Oceana

This alternative would utilize all existing capacity at both MCAS Beaufort and NAS Oceana and would require necessary additional construction at MCAS Beaufort. It would have the added advantage of collocating one airwing with Navy and Marine Corps F/A-18 squadrons and another airwing composed entirely of Navy squadrons at MCAS Beaufort.

MCAS Beaufort would require expansion of the parking apron, construction of a three-module hangar, and building renovation. To accommodate the projected F/A-18 operations, a new parallel runway would be required. This scenario would generally eliminate the hangar-module deficiency at NAS Oceana. Existing hangars would be reused/renovated to accommodate the F/A-18 aircraft.

Existing Marine Corps mobile AIMD facilities at MCAS Beaufort could support two Navy F/A-18 fleet squadrons. Because there is not enough capacity to conduct maintenance on five Navy F/A-18 aircraft, an AIMD facility would be constructed to ensure adequate specialized maintenance. At NAS Oceana, F/A-18 aircraft maintenance would be accomplished with existing facility additions and renovation.

2.3.5 Alternative Realignment Scenario 5: Transferring Five F/A-18 Fleet Squadrons to MCAS Cherry Point and Transferring Six F/A-18 Fleet Squadrons and the F/A-18 FRS to NAS Oceana

This alternative would utilize all existing capacity at MCAS Cherry Point and NAS Oceana and would require necessary additional construction at MCAS Cherry Point.

MCAS Cherry Point would require expansion of the parking apron, construction of a three-module hangar, and building renovation. To accommodate the projected F/A-18 operations, a new parallel runway would be required. This scenario would generally eliminate the hangar module deficiency at NAS Oceana. Existing hangars would be reused/renovated to accommodate the F/A-18 aircraft.

AIMD activities at MCAS Cherry Point are assigned to MALS-31. Currently, there is no F/A-18 repair capability at MCAS Cherry Point; therefore, a stand-alone F/A-18 AIMD facility would be required to support this ARS.

2.3.6 Life-cycle Cost Analysis

Each ARS was assessed in terms of total life-cycle costs over a 30-year period. This analysis calculated the net present value (NPV) in 1998 dollars (i.e., the year that realignment actions would begin under each ARS) and the total one-time and operational costs associated with implementation of each ARS. The analysis used a 3.6% discount rate, as mandated by the federal Office of Management and Budget (OMB).

One-time costs include construction/renovation needed to support each ARS and procurement or retrofitting of specialized equipment necessary to support F/A-18 operations and maintenance (e.g., AIMD equipment).

Operational costs include annual expenses that would be incurred under each ARS associated with facility operations, training, and personnel support. These consist of (LANTDIV 1997a):

- Expenses for maintenance of new/renovated facilities;
- Utilities costs;
- Personnel and equipment costs for aircraft maintenance (e.g., AIMD personnel);
- Bachelor and family housing costs, in terms of region-specific housing allowances given to Navy personnel; and
- Aircrew, flight simulator, and aircraft maintenance training costs, incurred for ARSs where all of the F/A-18 aircraft training facilities would not be collocated.

Table 2.3-1 presents a summary of life-cycle costs for ARSs 1, 2, 3, 4, and 5.

Table 2.3-1

SUMMARY OF LIFE-CYCLE COSTS ASSOCIATED WITH ARSs 1, 2, 3, 4, AND 5

Project Component	Costs (in thousands)				
	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Construction and Renovation	93,503	105,361	105,141	240,043	136,285
Operation and Maintenance	40,732	45,889	45,805	98,823	62,079
Utilities	5,309	6,269	7,449	17,223	6,505
Aircraft Maintenance	0	18,620	178,063	199,353	199,274
Housing	110,629	101,935	96,177	85,018	95,556
Training	0	5,382	7,658	22,844	19,778
Total	$250,173	$283,456	$440,293	$663,304	$519,477

2.4 Descriptions of Alternative Realignment Scenarios

This section presents the components of each ARS. It also presents the 30-year life-cycle costs associated with implementation of each ARS.

2.4.1 Alternative Realignment Scenario 1

ARS 1 includes the realignment of all 11 F/A-18 fleet squadrons (132 aircraft) and the F/A-18 FRS (containing 48 aircraft), a total of 180 aircraft, to NAS Oceana. This alternative includes the following components:

- Construction. Facilities are needed to support the operations and maintenance of F/A-18 aircraft and training of F/A-18 personnel, primarily consisting of reuse/renovation of existing facilities and/or additions to existing facilities; and

- Operations. Operational changes would occur, including the level of use of existing flight tracks around NAS Oceana, NALF Fentress, and military training areas in eastern North Carolina.

2.4.1.1 Construction Needed at NAS Oceana to Support Alternative Realignment Scenario 1

In order to support operation and maintenance of F/A-18 aircraft that would be realigned to NAS Oceana under ARS 1, 13 construction projects, primarily consisting of additions to existing facilities, would be required (see Figure 2.4-1). The one-time costs associated with each construction project are presented in Table 2.4-1. Descriptions of these projects are provided below.

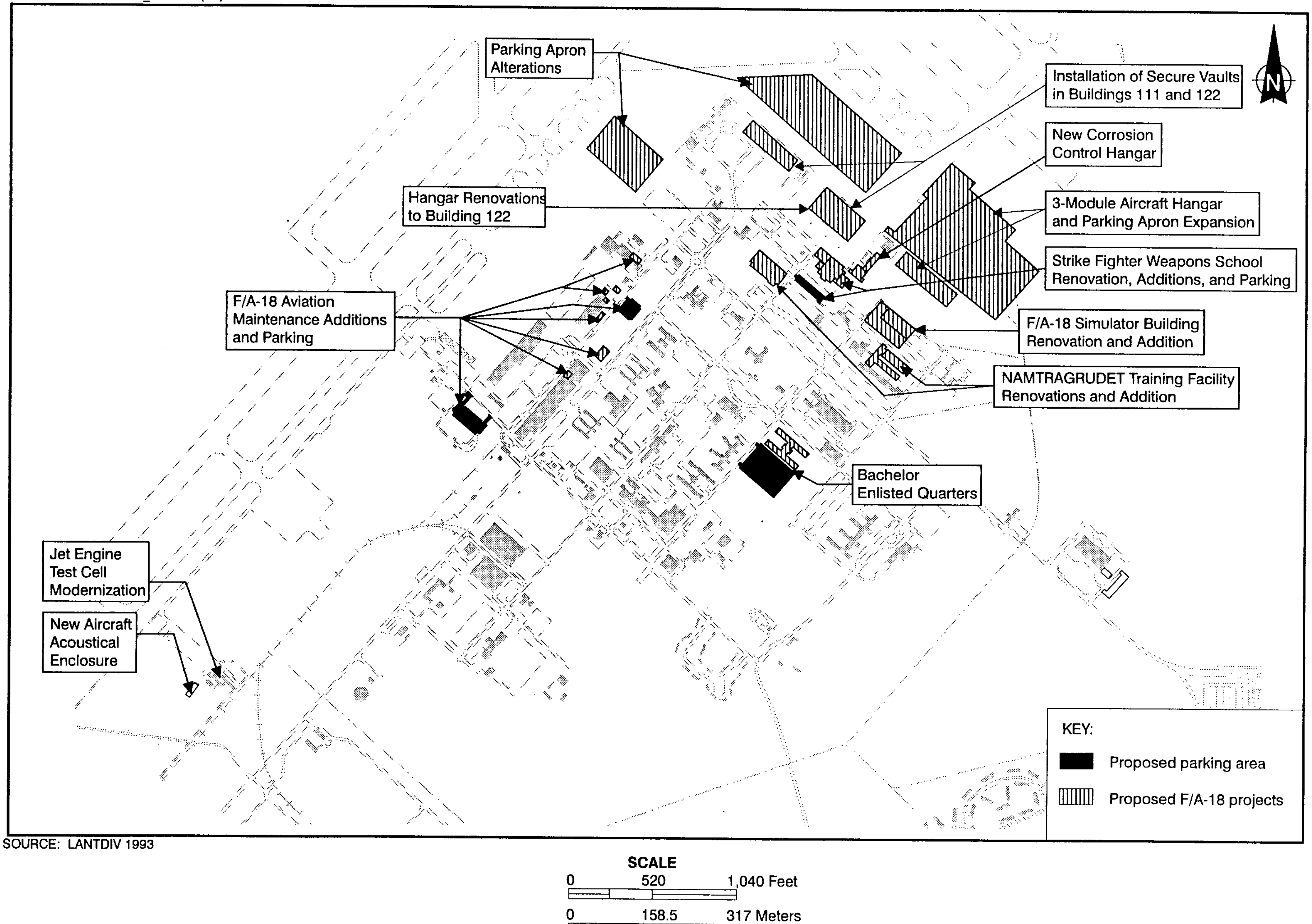
F/A-18 Parking Apron Alterations

This project would include two separate components:

- The installation of 6-foot by 6-foot steel (2-meter by 2-meter) plates along the flight line in the proposed F/A-18 parking area; and

- Installation of apron 400-hertz (Hz) converters (i.e., fixed-point utility systems [FPUSs]).

Because exhaust from F/A-18 auxiliary power units projects downward, plates must be installed on top of the existing concrete flight line in the proposed F/A-18 parking area to protect the pavement from damage during aircraft engine start-ups. The Hz converters are used to provide power to aircraft parked on the apron (LANTDIV 1995).



SOURCE: LANTDIV 1993

Figure 2.4-1 CONSTRUCTION NEEDED AT NAS OCEANA TO SUPPORT ARS 1

Table 2.4-1 SUMMARY OF NEEDED CONSTRUCTION PROJECTS AT NAS OCEANA TO SUPPORT ALTERNATIVE REALIGNMENT SCENARIO 1	
Project Description	**Facility Cost ($ in thousands)**
Parking Apron Alterations	3,526
Flight Simulator Facility	10,100
NAMTRAGRUDET Training Facility Renovation/Addition	5,700
Strike Fighter Weapons School Facilities and Parking	4,100
F/A-18 Aviation Maintenance Facilities and Parking	2,700
Corrosion Control Hangar	4,800
Installation of Secure Vaults in Hangars	133
Renovations to Building 122	1,900
Bachelor Enlisted Quarters and Parking	20,900
Jet Engine Testing Cell Replacement	5,535
Aircraft Acoustical Enclosure	11,900
3-Module Aircraft Hangar	12,931
Parking Apron Expansion	9,278
ARS 1 - TOTAL CONSTRUCTION COSTS	**$93,503**

Source: LANTDIV 1997a.

F/A-18 Flight Simulator Facility

This project would consist of the construction of a two-story, 53,916-square-foot (5,009-square-meter) addition to Building 140 to accommodate F/A-18 flight simulators. Currently, NAS Oceana operates F-14 flight simulators only. Excess simulator space created by the recent decommissioning of A-6 aircraft at the station is being filled by F-14D simulators which are being relocated to NAS Oceana to support 1993 BRAC directives. Additional space is required to house the incoming F/A-18 flight simulators.

The addition would wrap around the northwest and southwest sides of the existing building onto existing lawn areas and a portion of an underutilized parking area. The project also involves interior modifications to Building 140 (LANTDIV 1995).

Naval Maintenance Training Group Detachment (NAMTRAGRUDET) Training Facility

This project would include interior modifications and the construction of a one-story, 40,359-square-foot (3,749-square-meter) addition to Building 240 to house classroom and training space, and interior modifications to Building 223. Currently, NAMTRAGRUDET facilities at NAS Oceana are used to instruct students in the maintenance of fighter and attack aircraft. Excess space created by the recent decommissioning of A-6 aircraft at the station is not large enough to satisfy F/A-18 training requirements.

The Building 240 addition would create a new wing off the southeast portion of the building, currently a maintained lawn area.

Strike Fighter Weapons School Facilities and Parking

Three additions to Building 137, totaling 26,722 square feet (2,483 square meters), would be constructed under this project, including:

- A one-story addition to the northwest corner of the building (currently maintained lawn and parking) for inert weapons storage;
- A two-story addition to the southeast corner of the building (currently maintained lawn) for classroom space, offices, and rest rooms; and
- A one-story addition to the southwest corner of the building (currently maintained lawn) for a new 120-seat lecture hall.

The project would also involve the construction of a new 23,940-square-foot (2,224-square-meter), 76-space parking lot in an adjoining maintained lawn area. The construction

additions and the additional parking spaces are required to alleviate projected training space shortfalls for F/A-18 aircraft (LANTDIV 1995).

F/A-18 Aviation Maintenance Facilities and Parking

This project would involve a series of small additions and freestanding construction projects to augment facilities along the flight line. These projects include:

- Construction of a one-story, 2,820-square-foot (262-square-meter) addition to the northeast side of Building 301 (currently maintained lawn) for storage;
- Construction of two one-story spaces, totaling 3,143 square feet (292 square meters); one on the northeast side of Building 401 (currently a combination of maintained lawn and pavement) for a ground support equipment (GSE) shop and a stand-alone battery shop east of Building 401;
- Construction of a canopy extending from the southeast side of Building 401 for parking GSE vehicles;
- Construction of a 4,700-square-foot (437-square-meter) freestanding shed southeast of Building 401 (currently a wooded area) for storage of "Yellow Gear" (e.g., aircraft tugs); and
- Construction of a 3,000-square-foot (279-square-meter), one-story addition to Building 513 (on maintained lawn) for a composite shop (i.e., aircraft body repair); and
- Construction of a freestanding 5,290-square-foot (491-square-meter) building east of Building 513 for armament storage.

The project would also involve construction of two new parking lots, one 40,000-square-foot (3,716-square-meter), 100-space lot that would be located in a wooded area east of Building 401, and one 44,400-square-foot (4,125-square-meter), 78-space parking lot that would be located in a currently maintained lawn area west of Building 513. The construction additions and the additional parking spaces are required to alleviate projected intermediate level maintenance shortfalls for F/A-18 aircraft (LANTDIV 1995).

Corrosion Control Hangar

The construction of a new 13,322-square-foot (1,238-square-meter) hangar facility along the paved flight line would be included in this project. This project is required to provide space to wash and strip corrosive material, and paint F/A-18 aircraft at the operational maintenance level.

The proposed site is located southeast of Building 122, a former A-6 aircraft hangar that would be used for F/A-18 aircraft. The project would require the removal of five temporary buildings (Buildings 132, 133, 134, 137A, and 137B) and construction of a 4,135-square-foot (384-square-meter) extension of pavement from the southeastern end of the flight line (LANTDIV 1995).

Installation of Secure Vaults

This project would involve the installation of vaults in Buildings 111 and 122 designed to store classified documents for F/A-18 squadrons and secure debriefing spaces with the hangars.

Renovations to Building 122

This project would involve limited interior hangar renovations (e.g., installation of interior walls, utilities, etc.) to Building 122 designed for the specific requirements of F/A-18 squadrons.

Bachelor Enlisted Quarters and Parking

This project would involve the construction of a new 230-room, 173,300-square-foot (16,100-square-meter) BEQ designed to house 460 enlisted personnel (i.e., Grades E-1 through E-4). The facility would be located on a currently wooded site near the intersection of "E" Avenue and 3rd Street. The project would also include a surface parking lot for 357 vehicles.

Jet Engine Testing Cell Replacement

This project would involve the renovation of Building 1100, located at the southwestern end of the flight line, to facilitate testing of aircraft engines. It would include construction and installation of an acoustically-treated engine test enclosure, air intakes with silencers, and a structurally isolated ancillary building to house a test operator control room, fuel room, mechanical room, and rest room facilities. The project would also include demolition of an existing high-temperature exhaust silencing system, which would be replaced with a new air-cooled system.

Aircraft Acoustical Enclosure (i.e., Hush House)

This project would involve the construction of a new 11,795-square-foot (1,096-square-meter), one-story building to conduct high-powered, in-aircraft engine run-ups. The building would be equipped with acoustical elements to reduce noise emissions associated with these activities.

3-Module Aircraft Hangar

This project would involve the construction of a 116,502-square-foot (10,823-square-meter), 3-module hangar along the former A-6 flight line. The facility would be designed in full compliance with P-80 guidelines and would provide space for three fleet squadrons (i.e., 36 aircraft).

Parking Apron Expansion

This project would involve the construction of a 870,202-square-foot (80,844-square-meter) expansion of the aircraft parking apron along the former A-6 flight line. The expansion would be intended to provide parking space adjacent to the proposed 3-module aircraft hangar.

2.4.1.2 Demolition and Replacement Projects to Support Alternative Realignment Scenario 1

ARS 1 would not require any demolition or replacement of permanent structures or facilities at NAS Oceana.

2.4.1.3 Life-cycle Cost of Alternative Realignment Scenario 1

The NPV of the 30-year life-cycle costs of implementing ARS 1 would be approximately $250 million in 1998 dollars (see Table 2.4-2). The largest costs are associated with one-time costs (e.g., construction/renovation) and costs associated with family housing allowances (LANTDIV 1997a). (Housing allowances vary based on geographic locations; housing allowances near NAS Oceana are higher than in the areas of MCAS Beaufort and MCAS Cherry Point).

Table 2.4-2

LIFE-CYCLE COSTS[a] OF ALTERNATIVE REALIGNMENT SCENARIO 1

Project Component	Total Life-Cycle Costs ($ in thousands)
Construction and Renovation at NAS Oceana[b]	93,503
Operation and Maintenance	40,732
Utilities	5,309
Aircraft Maintenance[c]	0
Family Housing Costs[d]	76,851
Aircrew Training Costs[e]	0
Bachelor Housing Costs[f]	33,778
Flight Simulator Training Costs[g]	0
NAMTRAGRUDET Training Costs[h]	0
NET PRESENT VALUE OF TOTAL LIFE-CYCLE COSTS	**250,173**

a Total life-cycle costs projected over a 30-year period beginning in 1998. The analysis uses a 3.6% discount rate, as required by the federal Office of Management and Budget.

b Summary of construction and renovation costs provided in Table 2.4-1. All costs projected to be incurred in 1998.

c Represents costs associated with purchasing or retrofitting specialized equipment for maintenance of F/A-18 aircraft. Because all equipment would be relocated from NAS Cecil Field, no costs are allotted to this category.

d Family Housing Costs based upon variable housing allowances for the region around NAS Oceana.

e Represents travel and lodging costs associated with specialized training to F/A-18 aircrews, such as weapons training and flight and mission support training. Because all squadrons would be single-sited at NAS Oceana under ARS 1, no costs are allotted to this category.

f Bachelor housing costs based upon the variable housing allowances for the region around NAS Oceana, assuming that a portion of bachelors relocating would not be housed on base.

g Represents travel and lodging costs associated with specialized training of F/A-18 aviators. Because all squadrons would be single-sited at NAS Oceana under ARS 1, no costs are allotted to this category.

h Represents travel, lodging, and personnel costs associated with specialized training of F/A-18 maintenance personnel. Because all squadrons would be single-sited at NAS Oceana under ARS 1, no costs are allotted to this category.

Source: LANTDIV 1997a.

2.4.2 Alternative Realignment Scenario 2

ARS 2 would involve the realignment of two F/A-18 fleet squadrons (24 aircraft) to MCAS Beaufort. In addition, nine F/A-18 fleet squadrons (108 aircraft) and the F/A-18 FRS (48 aircraft), a total of 156 aircraft, would be realigned to NAS Oceana. This alternative includes the following components:

- Construction. Facilities are needed to support the operation and maintenance of F/A-18 aircraft and training of F/A-18 personnel, primarily consisting of reuse/renovation of existing facilities and/or additions to existing facilities at MCAS Beaufort and NAS Oceana;

- Operations. Operational changes would occur, including the level of use of existing flight tracks around MCAS Beaufort, military training areas in Georgia and South Carolina, NAS Oceana, NALF Fentress, and military training areas in eastern North Carolina.

2.4.2.1 Construction Needed at MCAS Beaufort to Support Alternative Realignment Scenario 2

In order to support operation and maintenance of 24 F/A-18 fleet aircraft that would be realigned to MCAS Beaufort under ARS 2, three construction projects would be required (see Figure 2.4-2). The one-time costs associated with construction under this ARS is presented in Table 2.4-3. A description of these projects is provided below.

F/A-18 Parking Apron Alterations and Mobile Facilities Pad

This project would include three separate components:

- The installation of 6-foot by 6-foot (2-meter by 2-meter) steel blast plates along the flight line in the proposed F/A-18 parking area;

- Installation of apron 400-hertz (Hz) converters (i.e., Fixed Point Utility Systems [FPUSs]); and

- Construction of approximately 386,995 square feet (35,953 square meters) of apron parking area pavement for a new Mobile Facilities (MF) Pad.

Crew, Equipment, and Administrative Building

This project involves construction of 17,234 square feet (1,601 square meters) of crew, equipment, and administrative space adjacent to the proposed MF Pad.

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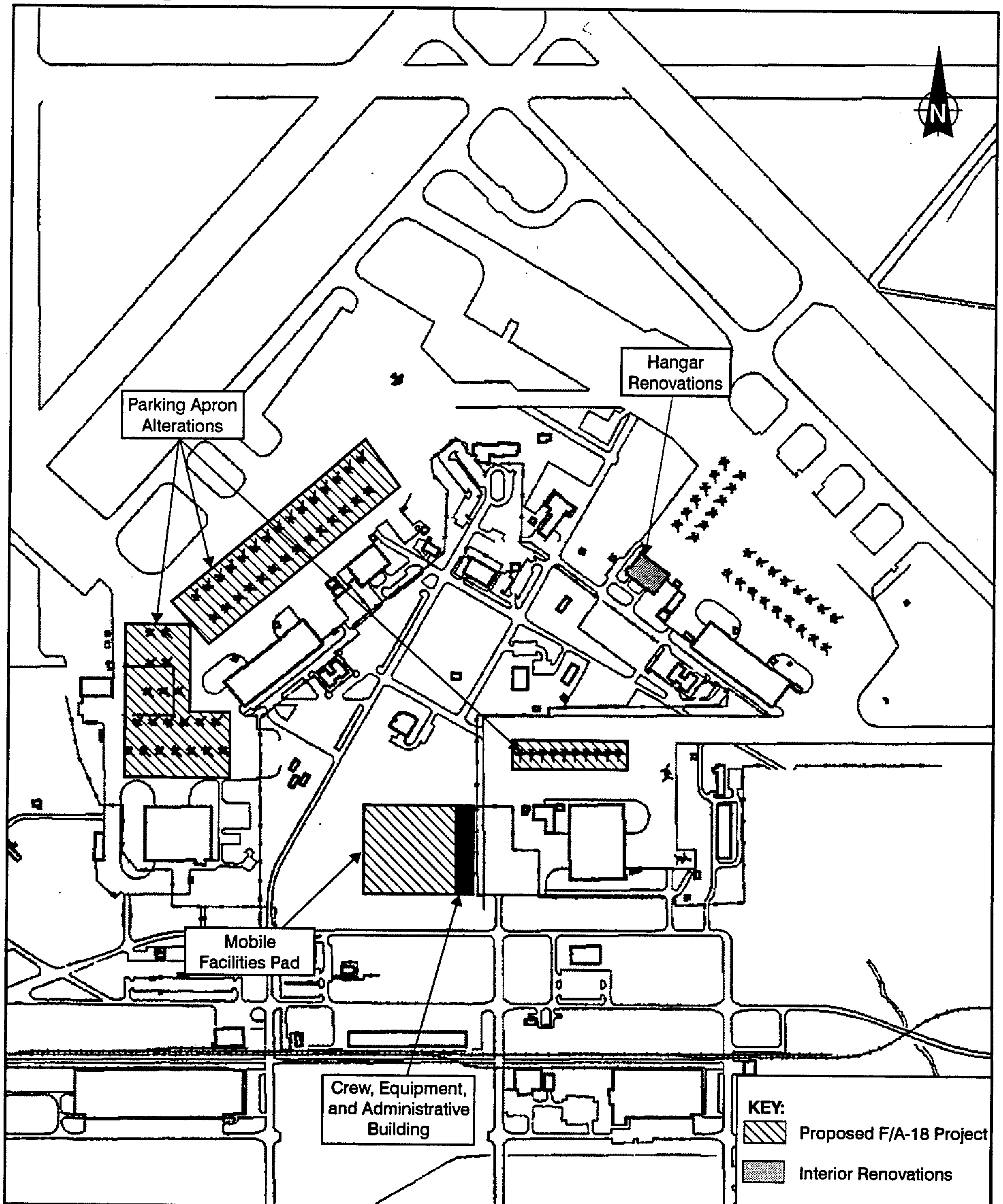

SOURCE: LANTDIV 1996b

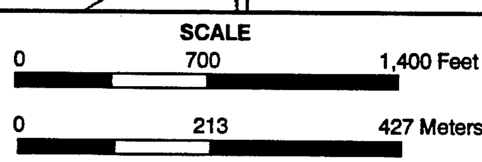

Figure 2.4-2 CONSTRUCTION NEEDED AT MCAS BEAUFORT TO SUPPORT ARS 2

Table 2.4-3

SUMMARY OF NEEDED CONSTRUCTION PROJECTS AT MCAS BEAUFORT AND NAS OCEANA TO SUPPORT ALTERNATIVE REALIGNMENT SCENARIO 2

Project Description	Facility Cost ($ in thousands)
MCAS Beaufort	
Aircraft Hangar Renovations	2,800
Crew, Equipment, and Administrative Building	2,226
Parking Apron Alterations	619
Mobile Facilities Pad	6,213
MCAS Beaufort Subtotal	**11,858**
NAS Oceana	
Parking Apron Alterations	3,526
Flight Simulator Facility	10,100
NAMTRAGRUDET Training Facility	5,700
Strike Fighter Weapons School Facilities and Parking	4,100
F/A-18 Aviation Maintenance Facilities and Parking	2,700
Corrosion Control Hangar	4,800
Bachelors Enlisted Quarters and Parking	20,900
Jet Engine Testing Cell Replacement	5,535
Aircraft Acoustical Enclosure	11,900
Installation of Secure Vaults in Hangars	133
Renovation to Building 122	1,900
3-Module Aircraft Hangar	12,931
Parking Apron Expansion	9,278
NAS Oceana Subtotal	**93,503**
ARS 2 - TOTAL CONSTRUCTION COSTS	**$105,361**

Source: LANTDIV 1997a.

Aircraft Hangar Renovations

This project would involve renovations to Building 729 necessary to accommodate Marine Corps F/A-18 aircraft. Upon completion, these renovations would allow Marine Corps assets to be relocated from Building 728 to Building 729, opening up space in Building 728 to accommodate Navy F/A-18 aircraft. Building renovations would be limited to interior modifications and seismic upgrades.

2.4.2.2 Construction Needed at NAS Oceana to Support Alternative Realignment Scenario 2

Under ARS 2, the large majority of F/A-18 assets would still be transferred to NAS Oceana. Therefore, it would still be the logical location of the majority of F/A-18 maintenance, training, and personnel support facilities. The transfer of 24 aircraft to MCAS Beaufort would not proportionately reduce the size or number of facilities that would be required to conduct these activities. Therefore, projects at NAS Oceana under ARS 2 would be the same as ARS 1.

2.4.2.3 Demolition and Replacement Projects to Support Alternative Realignment Scenario 2

ARS 2 would not require any demolition or replacement of permanent structures or facilities at MCAS Beaufort or NAS Oceana.

2.4.2.4 Life-cycle Cost of Alternative Realignment Scenario 2

The NPV of the 30-year life-cycle costs of implementing ARS 2 would be approximately $283 million (LANTDIV 1997a) in 1998 dollars (see Table 2.4-4). As compared with ARS 1, ARS 2 would result in additional construction costs at MCAS Beaufort, as well as additional specialized equipment and support personnel costs for maintenance of Navy, as opposed to Marine Corps, F/A-18 aircraft. In addition, ARS 2 would result in additional costs associated with aircrew and maintenance training because personnel would need to undertake these training cycles at NAS Oceana (LANTDIV 1997a). Conversely, family housing costs would be less than ARS 1, given regional differences in housing allowances (LANTDIV 1997a).

2.4.3 Alternative Realignment Scenario 3

ARS 3 would involve the realignment of three F/A-18 fleet squadrons (36 aircraft) to MCAS Cherry Point. In addition, eight F/A-18 fleet squadrons (96 aircraft) and the F/A-18

Table 2.4-4

LIFE-CYCLE COSTS[a] OF ALTERNATIVE REALIGNMENT SCENARIO 2

Project Component	Total Life Cycle Costs ($ in thousands)
Construction and Renovation at MCAS Beaufort and NAS Oceana[b]	105,361
Operation and Maintenance	45,889
Utilities	6,269
Aircraft Maintenance[c]	18,620
Family Housing Costs[d]	70,378
Aircrew Training Costs[e]	2,465
Bachelor Housing Costs[f]	31,557
Flight Simulator Training Costs[g]	0
NAMTRAGRUDET Training Costs[h]	2,917
NET PRESENT VALUE OF TOTAL LIFE-CYCLE COSTS	**$283,456**

a Total life-cycle costs projected over a 30-year period beginning in 1998. The analysis uses a 3.6% discount rate, as required by the federal Office of Management and Budget.

b Summary of construction and renovation costs provided in Table 2.4-3. All costs projected to be incurred in 1998.

c Represents costs associated with purchasing or retrofitting specialized equipment for maintenance of F/A-18 aircraft and for additional personnel costs for aircraft maintenance over a 30-year period. Because MCAS Beaufort has F/A-18 maintenance facilities for Marine Corps aircraft, costs represent those associated with equipment and personnel required specifically for the maintenance of Navy F/A-18 aircraft.

d Family Housing Costs based upon variable housing allowances for the regions around NAS Oceana and MCAS Beaufort.

e Represents travel and lodging costs associated with specialized training of F/A-18 aircrews, such as weapons training and flight and mission support training, that would be conducted at NAS Oceana for squadrons stationed at MCAS Beaufort.

f Bachelor housing costs based upon the variable housing allowances for the region around NAS Oceana and MCAS Beaufort, assuming that a portion of bachelors relocating would not be housed on base at either installation.

g Represents travel and lodging costs associated with specialized training of F/A-18 aviators. Because MCAS Beaufort has a F/A-18 simulator facility, no costs are allotted to this category.

h Represents travel and lodging costs associated with specialized training of F/A-18 maintenance personnel that would be conducted at NAS Oceana for personnel stationed at MCAS Beaufort.

Source: LANTDIV 1997a.

FRS (48 aircraft), a total of 144 aircraft, would be realigned to NAS Oceana. This alternative includes the following components:

- Construction. Facilities are needed to support the operation and maintenance of F/A-18 aircraft and training of F/A-18 personnel, consisting of new construction and reuse/renovation of existing facilities at MCAS Cherry Point and NAS Oceana;

- Operations. Operational changes would occur, including the level of use of existing flight tracks around MCAS Cherry Point, NAS Oceana, NALF Fentress, and military training areas in eastern North Carolina.

2.4.3.1 Construction Needed at MCAS Cherry Point to Support Alternative Realignment Scenario 3

In order to support 36 F/A-18 fleet aircraft that would be realigned to MCAS Cherry Point under ARS 3, three construction projects are proposed (see Figure 2.4-3). The one-time costs associated with construction under this ARS are presented in Table 2.4-5. Descriptions of these projects are provided below.

F/A-18 Parking Apron Alterations

This project would include two separate components:

- The installation of 6-foot by 6-foot steel (2-meter by 2-meter) plates along the flight line in the proposed F/A-18 parking area; and

- Installation of apron 400-Hz converters (i.e., FPUSs).

Aircraft Hangar Renovations

This project would include minor renovations to buildings 1665W, 131S, and 1700 to accommodate F/A-18 aircraft. The renovations would be limited to interior modifications.

AIMD Facility

This project would involve the construction of a 94,249-square-foot (8,756-square-meter) stand-alone facility near the flight line to perform intermediate maintenance on F/A-18 aircraft. The facility would be located on a portion of the site formerly occupied by H-style barracks (i.e., BEQs). The facility would include equipment to support maintenance to airframes, armaments, avionics systems, and engines. In addition, a ground support equipment (GSE) shop and GSE shed would be constructed.

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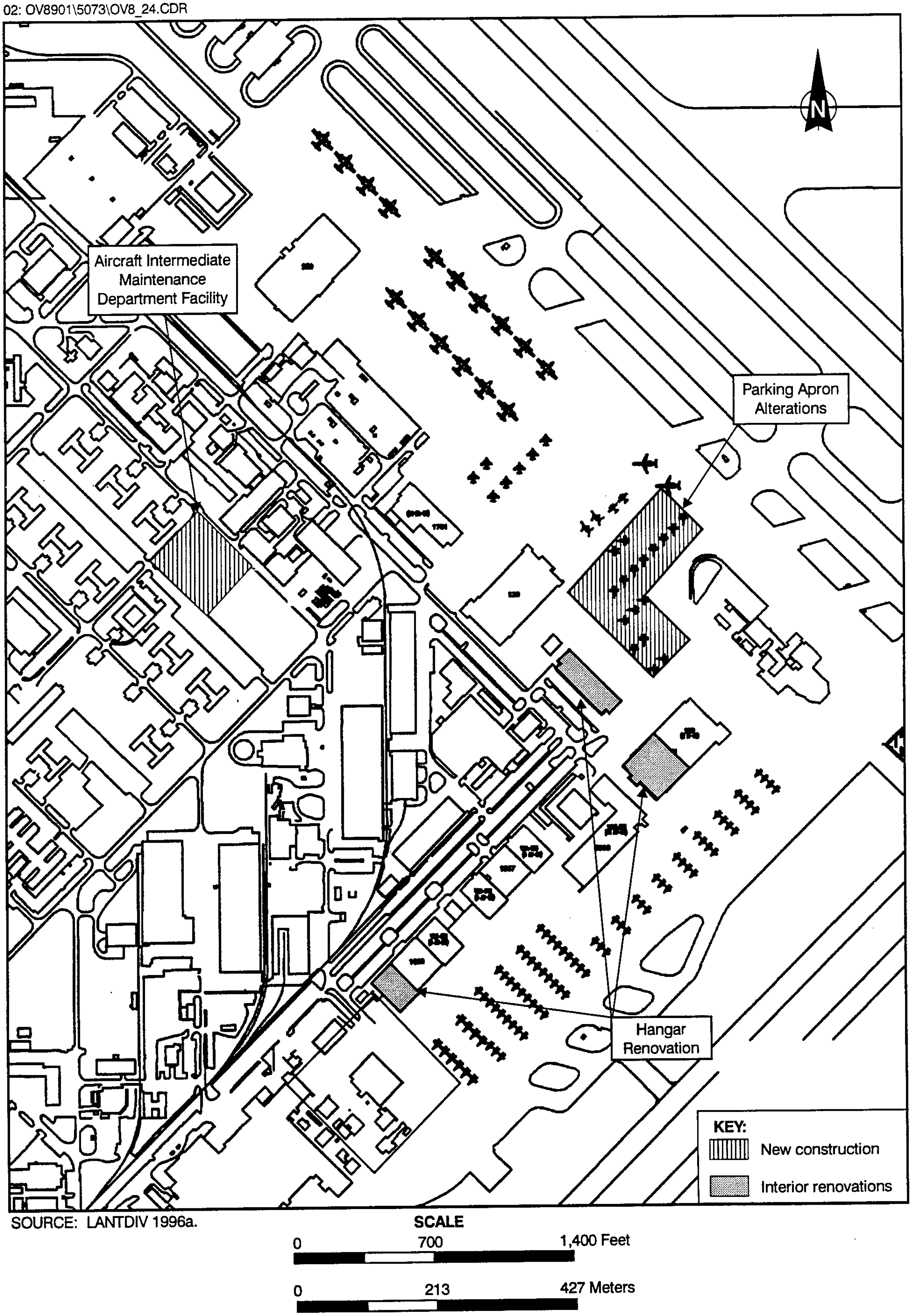

Figure 2.4-3 CONSTRUCTION NEEDED AT MCAS CHERRY POINT TO SUPPORT ARS 3

Table 2.4-5

SUMMARY OF NEEDED CONSTRUCTION PROJECTS AT MCAS CHERRY POINT AND NAS OCEANA TO SUPPORT ALTERNATIVE REALIGNMENT SCENARIO 3

Project Description	Facility Cost ($ in thousands)
MCAS Cherry Point	
Aircraft Hangar Renovations	5,326
Parking Apron Alterations	639
Aircraft Intermediate Maintenance Department Facility	11,674
MCAS Cherry Point Subtotal	**17,639**
NAS Oceana	
Parking Apron Alterations[a]	3,281
Flight Simulator Facility	10,100
NAMTRAGRUDET Training Facility Renovation/Addition	5,700
Strike Fighter Weapons School Facilities and Parking	4,100
F/A-18 Aviation Maintenance Facilities and Parking	2,700
Corrosion Control Hangar	4,800
Bachelors Enlisted Quarters and Parking	20,900
Jet Engine Testing Cell Replacement	5,535
Aircraft Acoustical Enclosure	11,900
Installation of Secure Vaults in Hangars	133
Renovations to Building 122	1,900
2-Module Aircraft Hangar[a]	9,103
Parking Apron Expansion[a]	7,350
NAS Oceana Subtotal	**87,502**
ARS 3 - TOTAL CONSTRUCTION COSTS	**$105,141**

[a] Costs slightly less than ARS 1 because less construction would be required.

Source: LANTDIV 1997a.

2.4.3.2 Construction Needed at NAS Oceana to Support Alternative Realignment Scenario 3

Similar to ARS 2 (see Section 2.4.2.2), ARS 3 would still involve the majority of F/A-18 assets being transferred to NAS Oceana. With the exception of the required parking apron expansion and aircraft hangar, the projects at NAS Oceana under ARS 3 would be the same as those under ARS 1 (see Figure 2.4-4). The aircraft hangar would need to consist of only 2 modules (77,668 square feet [7,216 square meters]) and the apron expansion would be reduced to 689,487 square feet (64,055 square meters).

2.4.3.3 Demolition and Replacement Projects to Support Alternative Realignment Scenario 3

ARS 3 would not require any demolition or replacement of permanent structures or facilities at MCAS Cherry Point or NAS Oceana.

2.4.3.4 Life-cycle Cost of Alternative Realignment Scenario 3

The NPV of the 30-year life-cycle costs of implementing ARS 3 would be approximately $440 million in 1998 dollars (see Table 2.4-6) (LANTDIV 1997a). As compared with ARS 1, ARS 3 would have higher one-time costs, primarily associated with additional construction needed at MCAS Cherry Point, as well as specialized equipment and personnel needed to support a new F/A-18 AIMD at MCAS Cherry Point. This differs from ARS 2 because MCAS Beaufort currently has F/A-18 maintenance facilities, in which personnel and certain equipment would only require supplementation/retrofitting to service Navy F/A-18 aircraft.

Training costs would also be higher under ARS 3 than ARS 1 because all aircrew, flight simulator, and aircraft maintenance training for MCAS Cherry Point squadrons would need to be conducted at NAS Oceana (LANTDIV 1997a). Bachelor and family housing costs would be lower than both ARS 1 and ARS 2, given regional differences in personnel housing allowances (LANTDIV 1997a).

2.4.4 Alternative Realignment Scenario 4

ARS 4 would involve the realignment of five F/A-18 fleet squadrons (60 aircraft) to MCAS Beaufort. In addition, six F/A-18 fleet squadrons (72 aircraft) and the F/A-18 FRS (48 aircraft), a total of 120 aircraft, would be realigned to NAS Oceana. This alternative includes the following components:

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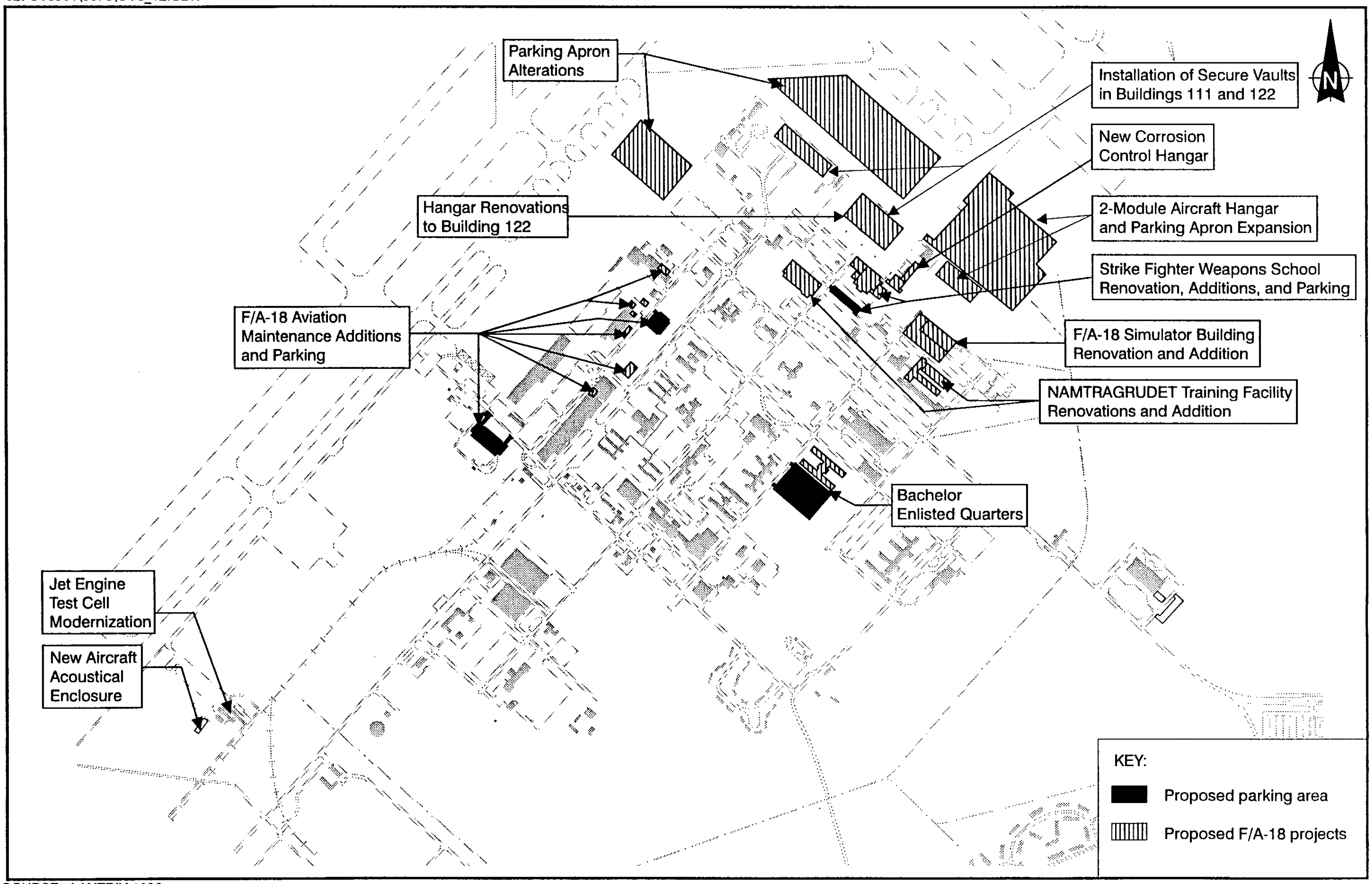

SOURCE: LANTDIV 1993

SCALE
0 520 1,040 Feet
0 158.5 317 Meters

Figure 2.4-4 CONSTRUCTION NEEDED AT NAS OCEANA TO SUPPORT ARS 3

Table 2.4-6

LIFE-CYCLE COSTS[a] OF ALTERNATIVE REALIGNMENT SCENARIO 3

Project Component	Total Life Cycle Costs ($ in thousands)
Construction and Renovation at MCAS Cherry Point and NAS Oceana[b]	105,141
Operation and Maintenance	45,805
Utilities	7,449
Aircraft Maintenance[c]	178,063
Family Housing Costs[d]	65,674
Aircrew Training Costs[e]	2,315
Bachelor Housing Costs[f]	30,503
Flight Simulator Training Costs[g]	1,542
NAMTRAGRUDET Training Costs[h]	3,801
NET PRESENT VALUE OF TOTAL LIFE-CYCLE COSTS	**$440,293**

a Total life-cycle costs projected over a 30-year period beginning in 1998. The analysis uses a 3.6% discount rate, as required by the federal Office of Management and Budget.

b Summary of construction and renovation costs provided in Table 2.4-5. All costs projected to be incurred in 1998.

c Represents costs associated with purchasing or retrofitting specialized equipment for maintenance of F/A-18 aircraft and personnel costs associated with aircraft maintenance over a 30-year period. Because MCAS Cherry Point currently has no F/A-18 maintenance facilities, costs represent those associated with equipping and staffing the proposed AIMD facility.

d Family Housing Costs based upon variable housing allowances for the regions around NAS Oceana and MCAS Cherry Point.

e Represents travel and lodging associated with specialized training of F/A-18 aircrews, such as weapons training and flight and mission support training, that would be conducted at NAS Oceana for squadrons stationed at MCAS Cherry Point.

f Bachelor housing costs based upon the variable housing allowances for the region around NAS Oceana and MCAS Cherry Point, assuming that a portion of bachelors relocating would not be housed on base at either installation.

g Represents travel and lodging associated with specialized training of F/A-18 aviators that would be conducted at NAS Oceana for squadrons stationed at MCAS Cherry Point.

h Represents travel and lodging costs associated with specialized training of F/A-18 maintenance personnel that would be conducted at NAS Oceana for personnel stationed at MCAS Cherry Point.

Source: LANTDIV 1997a.

- Construction. Facilities are needed to support the operation and maintenance of F/A-18 aircraft and training of F/A-18 personnel. This construction would consist primarily of reuse/renovation of existing facilities and/or additions to existing facilities at NAS Oceana and construction of several major facilities at MCAS Beaufort;

- Operations. Operational changes would occur, including the level of use of existing flight tracks around MCAS Beaufort, military training areas in Georgia and South Carolina, NAS Oceana, NALF Fentress, and military training areas in eastern North Carolina.

2.4.4.1 Construction Needed at MCAS Beaufort to Support Alternative Realignment Scenario 4

In order to support operation and maintenance of 60 aircraft in the F/A-18 fleet squadrons that would be realigned to MCAS Beaufort under ARS 4, the three construction projects under ARS 2 (i.e., F/A-18 parking apron alterations; crew, equipment, and administrative building; and aircraft hangar renovations) would be required, as well as 16 additional projects listed in Table 2.4-7. Figure 2.4-5 presents project sites; however, projects at the Laurel Bay Family Housing Area are not shown (see Section 3.2.4). The one-time costs associated with construction under this ARS are presented in Table 2.4-7. Descriptions of the required additional projects are provided below.

F/A-18 Parking Apron Alterations and Mobile Facilities Pad

This project would include three separate components:

- The installation of 6- by 6-foot (2-meter by 2-meter) steel blast plates along the flight line in the proposed F/A-18 parking area;

- Installation of apron 400-Hz converters (i.e., FPUSs); and

- Construction of approximately 386,995 square feet (35,953 square meters) of apron parking area pavement for a new MF Pad.

Crew, Equipment, and Administrative Building

This project would involve construction of 17,234 square feet (1,601 square meters) of crew, equipment, and administrative space adjacent to the proposed MF Pad.

Aircraft Hangar Renovations

This project would involve renovations to Buildings 729 and 594 necessary to accommodate Marine Corps F/A-18 aircraft. Upon completion, these renovations would

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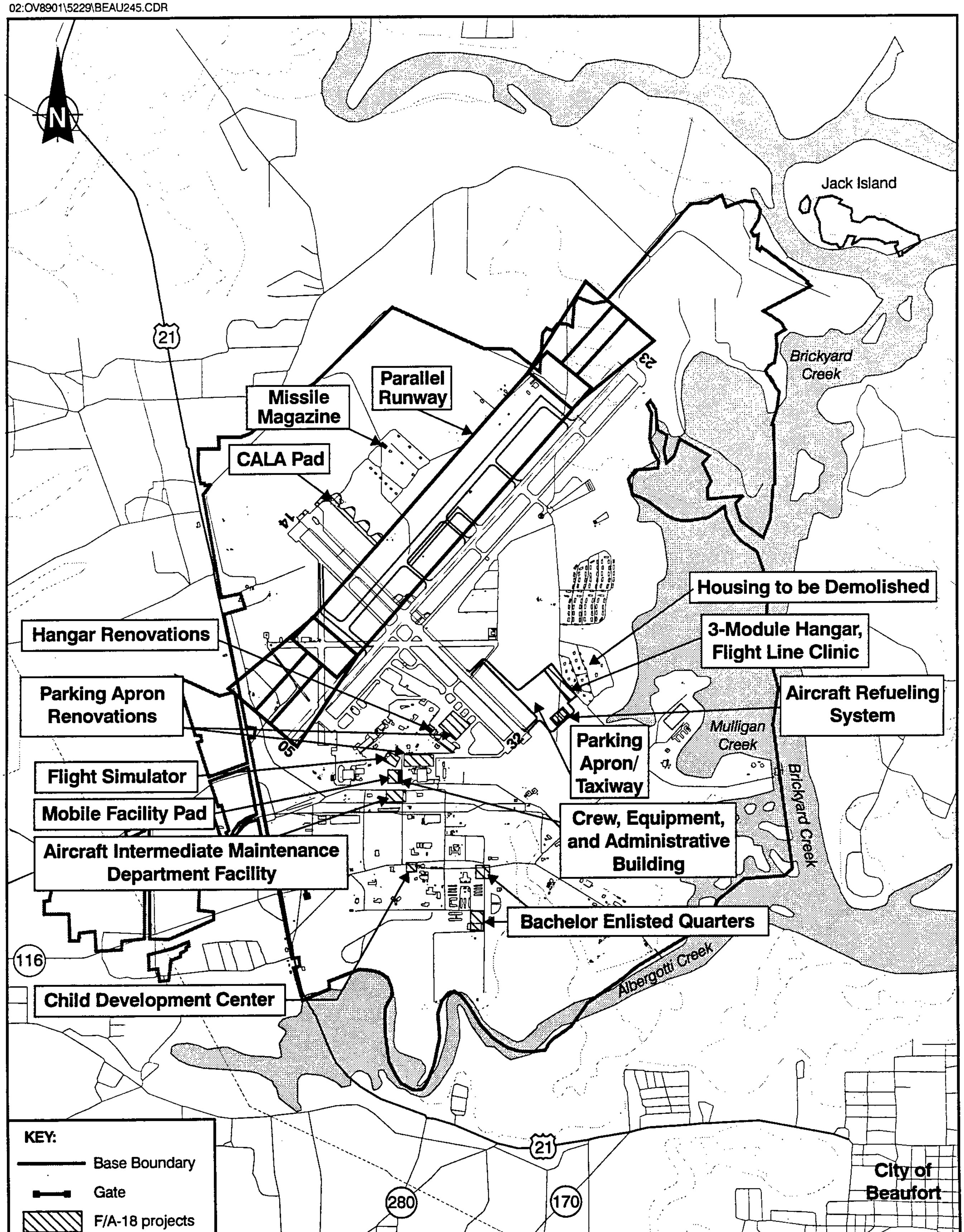

SOURCE: LANTDIV 1997c

SCALE

0 1,075 2,150 Meters

0 3,527 7,054 Feet

Figure 2.4-5 CONSTRUCTION NEEDED AT MCAS BEAUFORT TO SUPPORT ARS 4

Table 2.4-7

SUMMARY OF NEEDED CONSTRUCTION PROJECTS AT MCAS BEAUFORT AND NAS OCEANA TO SUPPORT ALTERNATIVE REALIGNMENT SCENARIO 4

Project Description	Facility Cost ($ in thousands)
MCAS Beaufort	
3-Module Aircraft Hangar	13,457
Crew, Equipment, and Administrative Building	2,226
Aircraft Hangar Renovations	2,800
Parking Apron Alterations	1,398
Mobile Facilities Pad	6,213
Parallel Runway/CALA Pad	38,312
Parking Apron Expansion and Taxiway	6,894
Aircraft Refueling System	10,349
Missile Magazine	2,047
Flight Line Medical Clinic	1,957
AIMD Facility	9,701
Flight-Simulator Expansion	6,580
Bachelor Enlisted Quarters (P-411)	15,070
Bachelor Enlisted Quarters (P-412)	13,590
Child Development Center	1,441
Family Housing	24,765
Wastewater Treatment Plant - Laurel Bay	2,560
Utility Improvements/Infrastructure Demolition	6,054
Building Demolition/Replacement	5,803
MCAS Beaufort Subtotal	**171,217**
NAS Oceana	
Parking Apron Alterations[a]	2,791
Flight Simulator Facility[a]	5,050
NAMTRAGRUDET Training Facility	5,700
Strike Fighter Weapons School Facilities and Parking	4,100
F/A-18 Aviation Maintenance Facilities and Parking[a]	2,622
Corrosion Control Hangar	4,800
Bachelor Enlisted Quarters and Parking	20,900
Jet Engine Testing Cell Replacement	5,535
Aircraft Acoustical Enclosure	11,900

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Table 2.4-7

SUMMARY OF NEEDED CONSTRUCTION PROJECTS AT MCAS BEAUFORT AND NAS OCEANA TO SUPPORT ALTERNATIVE REALIGNMENT SCENARIO 4

Project Description	Facility Cost ($ in thousands)
Installation of Secure Vaults in Hangars	133
Renovation to Building 122	1,900
Parking Apron Expansion[a]	3,395
NAS Oceana Subtotal	**68,826**
ARS 4 - TOTAL CONSTRUCTION COSTS	**$240,043**

[a]Costs slightly less than ARS 1 because less construction would be required.

Source: LANTDIV 1997a.

allow Marine Corps assets to be relocated from Building 416 to Buildings 729 and 594, opening up space in Building 416 to accommodate Navy F/A-18 aircraft. Building renovations would be limited to interior modifications and seismic upgrades.

Parallel Runway

This project would involve the construction of a new 8,000-foot (2,438-meter) parallel runway, designed in accordance with P-80 and COMNAVAIRLANT criteria. The runway would include the construction of appropriate taxiways, utilities, landing systems, and lighting. It would also include the creation of unobstructed clear zones and transitional zones adjacent to the runway surface. The creation of the zones would require a substantial amount of building demolition and the purchase of development easements for a small area outside of the station's boundaries.

Combat Aircraft Loading Area Pad

This project would include the construction of a 537,033-square-foot (49,892-square-meter) paved area for a relocated Combat Aircraft Loading Area (CALA) Pad, designed to provide an area for safe loading of aircraft ordnance (e.g., bombs, missiles). The CALA Pad is currently in the area proposed for the new parallel runway required under this ARS.

3-Module Aircraft Hangar

This project would involve the construction of a 116,502-square-foot (10,823-square-meter), 3-module hangar on the north side of the southeastern runway. This facility would be designed in full compliance with P-80 guidelines and would provide for three fleet squadrons (i.e., 36 aircraft). Construction of the hangar will necessitate the demolition of 22 units of family housing located in the Pine Grove Housing Area of the base.

Parking Apron Expansion/Taxiway

This project would involve construction of a 673,038-square-foot (65,527-square-meter) parking apron and a 209,016-square-foot (19,418-square-meter) taxiway on the north side of the southeastern runway.

Aircraft Refueling System

This project would involve the construction of a 2,600-foot (792-meter) twin stainless steel piping connection to the existing fuel farm and two 5,000-barrel (795-m^3) fuel storage tanks along the new apron area near the new 3-module hangar.

AIMD Facility

This project would involve the construction of a 76,179-square-foot (7,077-square-meter) multipurpose facility for F/A-18 maintenance. It would include shops and facilities for F/A-18 armaments, avionics, engines, and GSE, as well as GSE and aviation supply storage.

Flight Simulator Expansion

This project would include the construction of a 41,000-square-foot (3,809-square-meter) expansion of the station's current flight simulator facilities to house additional F/A-18 simulators. Additional simulator facilities would be required to support training demands of F/A-18 pilots.

Missile Magazine

This project would involve construction of a missile magazine required to store the moderate amount of ordnance used by F/A-18 squadrons.

Flight Line Medical Clinic

This project would involve construction of an 11,250-square-foot (1,045-square-meter) medical clinic to provide additional medical services for personnel associated with the F/A-18 squadrons.

Wastewater Treatment Plant - Laurel Bay Family Housing Area

This project would involve expansion of the existing wastewater treatment plant at the Laurel Bay Family Housing Area. Additional wastewater treatment capacity would be required to support the increased number of families at the Laurel Bay Family Housing Area.

Bachelor Enlisted Quarters

This project would include the construction of a 90,847-square-foot (8,440-square-meter) 211-room expansion (P-411) and an 80,514-square-foot (7,480-square-meter) 187-room

expansion (P-412) of the station's current BEQ facilities, which would be required to house grades E-1 to E-6 bachelors.

Child Development Center

This project would involve the construction of an 8,643-square-foot (803-square-meter) child development center designed to satisfy new demand that would occur by locating the five F/A-18 squadrons to MCAS Beaufort.

Family Housing

A total of 240 family housing units would be constructed in the Laurel Bay Family Housing Area, located 3 miles west of MCAS Beaufort.

2.4.4.2 Construction Needed at NAS Oceana to Support Alternative Realignment Scenario 4

Under ARS 4, six F/A-18 fleet squadrons and the FRS would be transferred to NAS Oceana. Therefore, it would still be the logical location of the majority of F/A-18 maintenance, training, and personnel support facilities. The transfer of 60 aircraft to MCAS Beaufort would not proportionately reduce the size or number of facilities that would be required to conduct these activities, with the exception of a reduction in level of parking apron expansion, hangar construction, and aircraft maintenance facilities (see Figure 2.4-6). Under ARS 4, no aircraft hangar module construction would be required at NAS Oceana. The apron expansion would be a relatively small addition (99,243-square-feet [9,220-square-meters]) of paved area along the former A-6 flight line.

2.4.4.3 Demolition and Replacement Projects to Support Alternative Realignment Scenario 4

Demolition and replacement projects needed to support ARS 4 at MCAS Beaufort are presented in Table 2.4-8. ARS 4 would not require any demolition or replacement of permanent structures or facilities at NAS Oceana.

2.4.4.4 Life-cycle Cost of Alternative Realignment Scenario 4

The NPV of the 30-year life-cycle costs of implementing ARS 4 would be approximately $663 million in 1998 dollars (see Table 2.4-9) (LANTDIV 1997a). As compared with ARS 1, ARS 4 would result in greater construction costs at MCAS Beaufort, as well as additional specialized equipment and support personnel costs for maintenance of Navy, as

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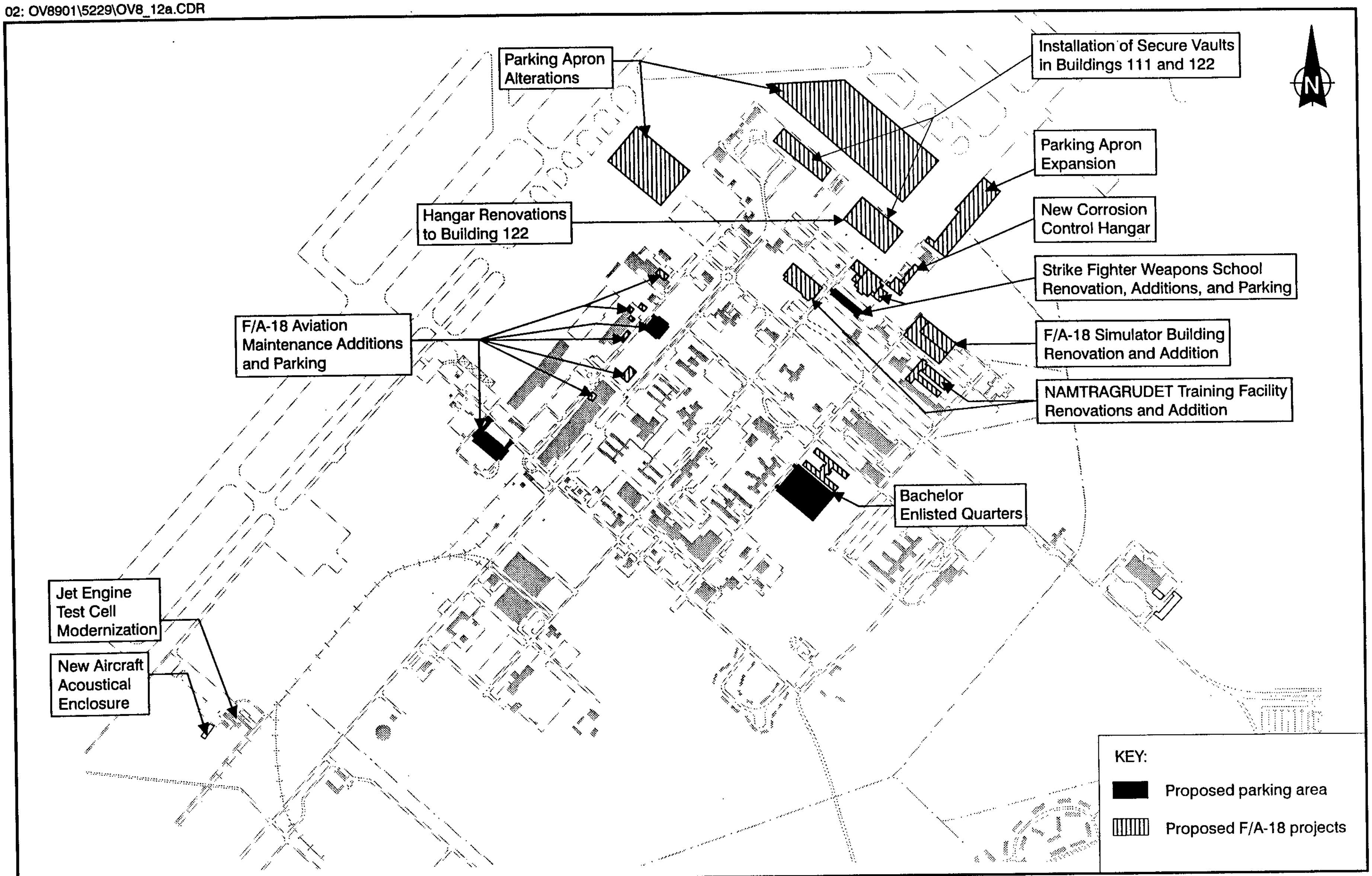

SOURCE: LANTDIV 1993

Figure 2.4-6 CONSTRUCTION NEEDED AT NAS OCEANA TO SUPPORT ARS 4

Table 2.4-8

DEMOLITION AND REPLACEMENT PROJECTS[a] NECESSARY TO SUPPORT ARS 4 MCAS BEAUFORT

Name
Fuse and Detonator Mag
Small Arms/Pyrotech. Mag
Power Check Pad
Blast Deflector Fence
Ordnance Operations Building
Septic Tank
Inert Storage Building
Warehouse
Blast Deflector Fence
Power Check Pad
Inert Storage Building
Inert Storage Building
Fixed A/C Start System
Field Maintenance Shop
A/C Power Check Facility
Blast Deflector Fence
Power Check Pad
Harrier Power Check Facility
Ordnance Operations Building
Used Oil Storage
LOX Storage Shed
Crash Site
Hazardous Waste Storage and Transfer Building
Ready Mag/CALA
Ordnance Operations Building/Combat Load Area
Potable Well
Storage Shed
Blast Deflector Pad

Table 2.4-8

DEMOLITION AND REPLACEMENT PROJECTS[a] NECESSARY TO SUPPORT ARS 4 MCAS BEAUFORT

Name
Ordnance Area Shop and Storage
Aviation Armament Shop
Mock Up and Training Center/Fire Training Building
Prod Strg Rdy 1
Pump House Relocation
Nitrogen Compressor
Transformer Station
Activity Heating Fuel Storage
Van Pad
Pine Grove Housing Area

a The relocation/replacement of the Ready Mag/CALA is the only replacement project evaluated in this DEIS. It has not been determined whether the other facilities scheduled for demolition would be replaced. Therefore, proposed sites for relocation are not evaluated in this DEIS. If it is later determined that replacement of additional facilities is required, the environmental impacts of replacement projects will be evaluated in separate NEPA documentation.

Table 2.4-9

LIFE-CYCLE COSTS[a] OF ALTERNATIVE REALIGNMENT SCENARIO 4

Project Component	Total Life Cycle Costs ($ in thousands)
Construction and Renovation at MCAS Beaufort and NAS Oceana[b]	240,043
Operation and Maintenance	98,823
Utilities	17,223
Aircraft Maintenance[c]	199,353
Family Housing Costs[d]	55,964
Aircrew Training Costs[e]	6,153
Bachelor Housing Costs[f]	29,054
Flight Simulator Training Costs[g]	9,409
NAMTRAGRUDET Training Costs[h]	7,282
NET PRESENT VALUE OF TOTAL LIFE-CYCLE COSTS	**$663,304**

a Total life-cycle costs projected over a 30-year period beginning in 1998. The analysis uses a 3.6% discount rate, as required by the federal Office of Management and Budget.

b Summary of construction and renovation costs provided in Table 2.4-7. All costs projected to be incurred in 1998.

c Represents costs associated with purchasing or retrofitting specialized equipment for maintenance of F/A-18 aircraft and for additional personnel costs for aircraft maintenance over a 30-year period. Because MCAS Beaufort has F/A-18 maintenance facilities for Marine Corps aircraft only costs represent those associated with equipment and personnel required specifically for a new AIMD facility for the maintenance of Navy F/A-18 aircraft.

d Family Housing Costs based upon variable housing allowances for the regions around NAS Oceana and MCAS Beaufort.

e Represents travel and lodging costs associated with specialized training of F/A-18 aircrews, such as weapons training and flight and mission support training. Because training facilities are proposed at MCAS Beaufort, no costs are included.

f Bachelor housing costs based upon the variable housing allowances for the region around NAS Oceana and MCAS Beaufort, assuming that a portion of bachelors relocating would not be housed on base at either installation.

g Represents travel and lodging costs associated with specialized training of F/A-18 aviators.

h Represents travel and lodging costs associated with specialized training of F/A-18 maintenance personnel that would be conducted at NAS Oceana for personnel stationed at MCAS Beaufort.

Source: LANTDIV 1997a.

opposed to Marine Corps, F/A-18 aircraft. In addition, ARS 4 would result in additional costs associated with maintenance training because personnel would need to undertake some training cycles at NAS Oceana (LANTDIV 1997a). Conversely, given regional differences in housing allowances, family housing costs would be less than ARS 1 (LANTDIV 1997a).

2.4.5 Alternative Realignment Scenario 5

ARS 5 would involve the realignment of five F/A-18 fleet squadrons (60 aircraft) to MCAS Cherry Point. In addition, six F/A-18 fleet squadrons (72 aircraft) and the F/A-18 FRS (48 aircraft), a total of 120 aircraft, would be realigned to NAS Oceana. This alternative includes the following components:

- Construction. Facilities are needed to support the operation and maintenance of F/A-18 aircraft and training of F/A-18 personnel. This construction would consist primarily of reuse/renovation of existing facilities and/or additions to existing facilities at NAS Oceana and construction of several major facilities at MCAS Cherry Point;

- Operations. Operational changes would occur, including the level of use of existing flight tracks around MCAS Cherry Point, NAS Oceana, NALF Fentress, and military training areas in eastern North Carolina.

2.4.5.1 Construction Needed at MCAS Cherry Point to Support Alternative Realignment Scenario 5

In order to support 60 F/A-18 fleet aircraft that would be realigned to MCAS Cherry Point under ARS 5, the three construction projects required under ARS 3 (i.e., F/A-18 parking apron alterations and AIMD facility) would be required, although in an expanded version, as well as five additional projects (see Figure 2.4-7). The one-time costs associated with construction under this ARS are presented in Table 2.4-10. Descriptions of these projects are provided below.

F/A-18 Parking Apron Alterations

This project would include two separate components:

- The installation of 6-foot by 6-foot steel (2-meter by 2-meter) plates along the flight line in the proposed F/A-18 parking area; and

- Installation of apron 400-Hz converters (i.e., FPUSs).

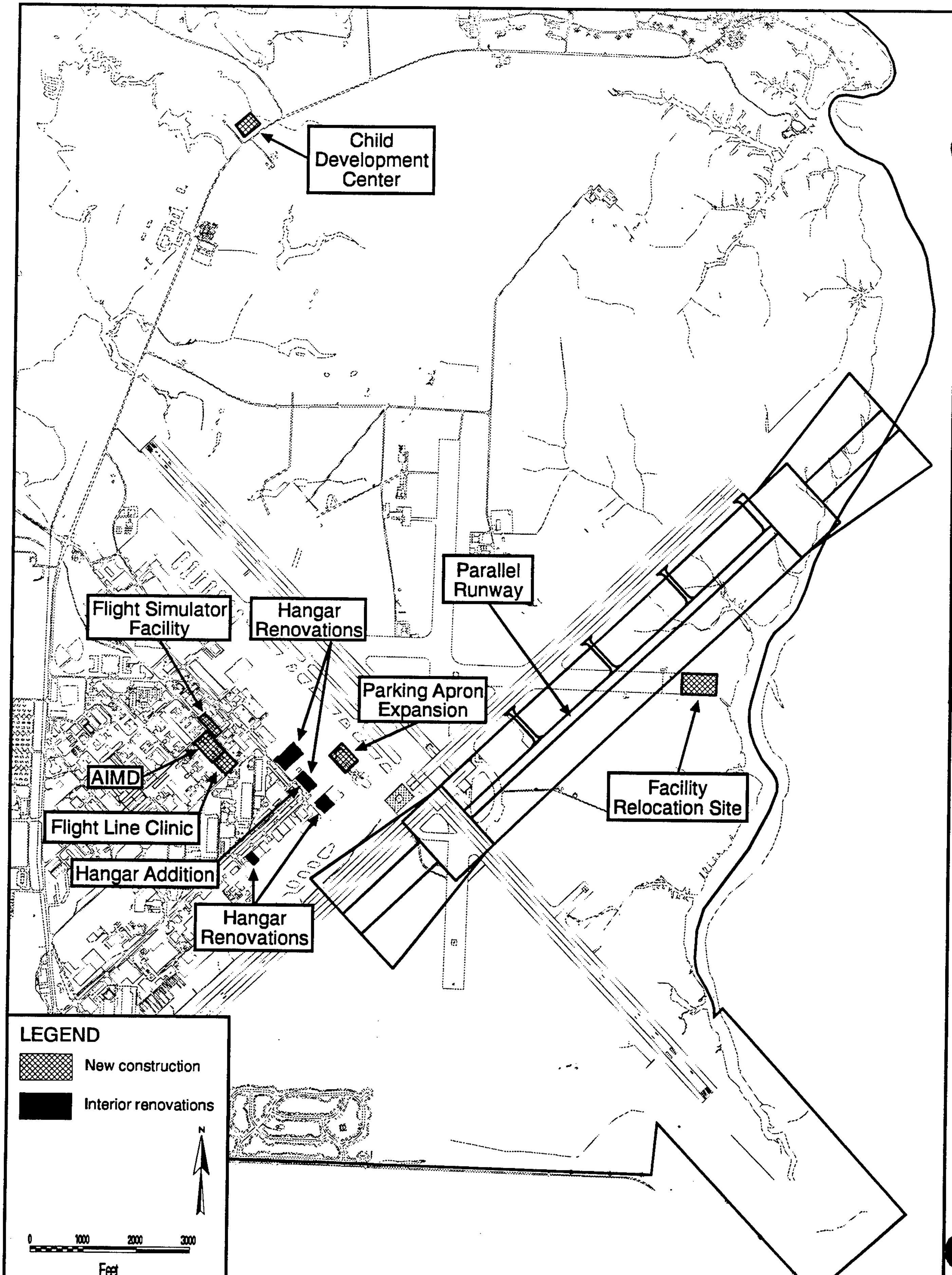

Figure 2.4-7
Construction Needed at MCAS Cherry Point to Support ARS 5

Table 2.4-10

SUMMARY OF NEEDED CONSTRUCTION PROJECTS AT MCAS CHERRY POINT AND NAS OCEANA TO SUPPORT ALTERNATIVE REALIGNMENT SCENARIO 5

Project Description	Facility Cost ($ in thousands)
MCAS Cherry Point	
Aircraft Hangar Renovations/Construction	10,556
Parking Apron Alterations/Expansion	1,692
Aircraft Intermediate Maintenance Department Facility	13,210
Flight Simulator Expansion	6,580
Flight Line Clinic	976
Child Development Center	1,397
Parallel Runway/Facility Relocation Site	33,048
MCAS Cherry Point Subtotal	**67,459**
NAS Oceana	
Parking Apron Alterations[a]	2,791
Flight Simulator Facility	5,050
NAMTRAGRUDET Training Facility Renovation/Addition	5,700
Strike Fighter Weapons School Facilities and Parking	4,100
F/A-18 Aviation Maintenance Facilities and Parking	2,622
Corrosion Control Hangar	4,800
Bachelors Enlisted Quarters and Parking	20,900
Jet Engine Testing Cell Replacement	5,535
Aircraft Acoustical Enclosure	11,900
Installation of Secure Vaults in Hangars	133
Renovations to Building 122	1,900
Parking Apron Expansion[a]	3,395
NAS Oceana Subtotal	**68,826**
ARS 5 - TOTAL CONSTRUCTION COSTS	**$136,285**

a Costs slightly less than ARS 1 because less construction would be required.

Source: LANTDIV 1997a.

Aircraft Hangar Renovations/Addition

This project would include renovations to buildings 1665W, 130, 131S, and 1700 to accommodate F/A-18 aircraft. The renovations would be limited to interior modifications. A 19,799-square-foot (1,839-square-meter) addition to Building 1700 also would be required.

AIMD Facility

This project would involve the construction of a 111,153-square-foot (10,326-square-meter) stand-alone facility near the flight line to perform intermediate maintenance on F/A-18 aircraft. The facility would be located on a portion of the site formerly occupied by H-style barracks (i.e., BEQs). The facility would include equipment to support maintenance to airframes, armaments, avionics systems, and engines. In addition, a ground support equipment (GSE) shop and GSE shed would be constructed.

Flight Simulator Expansion

This project would involve the construction of a 41,000-square-foot (3,809-square-meter) expansion of the station's current flight simulator facilities to house additional F/A-18 simulators. Additional simulator facilities would be required to support training demands of F/A-18 pilots.

Flight Line Medical Clinic

This project would involve construction of a 5,600-square-foot (520-square-meter) medical clinic to provide additional medical services for personnel associated with the F/A-18 squadrons.

Child Development Center

This project would involve the construction of a 8,643-square-foot (803-square-meter) child development center, designed to satisfy new demand that would occur by locating the five F/A-18 squadrons to MCAS Cherry Point.

Parking Apron Expansion

This project would involve construction of 68,512 square feet (6,365 square meters) of additional parking apron for the F/A-18 aircraft.

Parallel Runway/Facility Relocation Site

This project would involve construction of an 8,000-foot (2,438-meter) runway, designed in accordance with P-80 and COMNAVAIRLANT criteria. The runway would include the construction of appropriate taxiways, utilities landing systems, and lighting. It would also include the creation of unobstructed clear zones and transitional zones adjacent to the runway surface. The creation of the zones would require building demolition and the purchase of development easements. The Facility Relocation Site consists of a new impervious pavement for the High-power Run-up Area and support buildings.

2.4.5.2 Construction Needed at NAS Oceana to Support Alternative Realignment Scenario 5

Under ARS 5, six F/A-18 fleet squadrons and the FRS would be transferred to NAS Oceana. Therefore, it would still be the logical location of the majority of F/A-18 maintenance, training, and personnel support facilities. The transfer of 60 aircraft to MCAS Cherry Point would not proportionately reduce the size or number of facilities that would be required to conduct these activities, with the exception of a reduction in level of parking apron expansion, hangar construction, and aircraft maintenance facilities as in ARS 4 (see Figure 2.4-6). Under ARS 5, no aircraft hangar module construction would be required at NAS Oceana. The apron expansion would be a relatively small addition (99,243-square-feet [9,220-square-meters]) of paved area along the former A-6 flight line.

2.4.5.3 Demolition and Replacement Projects Necessary to Support Alternative Realignment Scenario 5

Demolition and replacement projects needed to support ARS 5 at MCAS Cherry Point are presented in Table 2.4-11. ARS 5 would not require any demolition or replacement of permanent structures or facilities at NAS Oceana.

2.4.5.4 Life-cycle Cost of Alternative Realignment Scenario 5

The NPV of the 30-year life-cycle costs of implementing ARS 5 would be approximately $519 million in 1998 dollars (see Table 2.4-12) (LANTDIV 1997a). As compared with ARS 1, ARS 5 would result in greater construction costs at MCAS Cherry Point, as well as additional specialized equipment and support personnel costs for maintenance of Navy, as

Table 2.4-11

DEMOLITION AND REPLACEMENT PROJECTS NECESSARY TO SUPPORT ARS 5 MCAS CHERRY POINT[a]

Name
High-power Run-Up Support Buildings
High-power Run-up Area
Transmitter/Receiver
TACAN
Harrier Pad
Radar

a The relocation/replacement of the high-power run-up area and support buildings are the only replacement projects evaluated in this DEIS. Sites for the antennas and carrier pad have not yet been determined. Once sites for these projects are determined, the environmental impacts of these projects will be evaluated in separate NEPA documentation.

opposed to Marine Corps, F/A-18 aircraft. In addition, ARS 5 would result in additional costs associated with maintenance training because personnel would need to undertake some training cycles at NAS Oceana (LANTDIV 1997a). Conversely, given regional differences in housing allowances, family housing costs would be less than ARS 1 (LANTDIV 1997a).

Table 2.4-12

LIFE-CYCLE COSTS[a] OF ALTERNATIVE REALIGNMENT SCENARIO 5

Project Component	Total Life Cycle Costs ($ in thousands)
Construction and Renovation at MCAS Beaufort and NAS Oceana[b]	136,285
Operation and Maintenance	62,079
Utilities	6,505
Aircraft Maintenance[c]	199,274
Family Housing Costs[d]	66,426
Aircrew Training Costs[e]	3,877
Bachelor Housing Costs[f]	29,130
Flight Simulator Training Costs[g]	9,409
NAMTRAGRUDET Training Costs[h]	6,492
NET PRESENT VALUE OF TOTAL LIFE-CYCLE COSTS	**$519,477**

a Total life-cycle costs projected over a 30-year period beginning in 1998. The analysis uses a 3.6% discount rate, as required by the federal Office of Management and Budget.

b Summary of construction and renovation costs provided in Table 2.4-7. All costs projected to be incurred in 1998.

c Represents costs associated with purchasing or retrofitting specialized equipment for maintenance of F/A-18 aircraft and for additional personnel costs for aircraft maintenance over a 30-year period. Because MCAS Cherry Point has F/A-18 maintenance facilities for Marine Corps aircraft only costs represent those associated with equipment and personnel required specifically for a new AIMD facility for the maintenance of Navy F/A-18 aircraft.

d Family Housing Costs based upon variable housing allowances for the regions around NAS Oceana and MCAS Cherry Point.

e Represents travel and lodging costs associated with specialized training of F/A-18 aircrews, such as weapons training and flight and mission support training. Because training facilities are proposed at MCAS Cherry Point, no costs are included.

f Bachelor housing costs based upon the variable housing allowances for the region around NAS Oceana and MCAS Cherry Point, assuming that a portion of bachelors relocating would not be housed on base at either installation.

g Represents travel and lodging costs associated with specialized training of F/A-18 aviators.

h Represents travel and lodging costs associated with specialized training of F/A-18 maintenance personnel that would be conducted at NAS Oceana for personnel stationed at MCAS Cherry Point.

Source: LANTDIV 1997a.

2.5 Evaluation of Alternative Realignment Scenarios

Table 2.5-1 presents a summary of the effects of each ARS. Tables 2.5-2, 2.5-3, and 2.5-4 present a comparison of area and population affected by noise contours and APZs off station for AICUZ, baseline, and each ARS. A full discussion of the environmental impacts of each ARS is presented in Sections 4, 5, 6, 7, and 8.

ARS 1 would consolidate all F/A-18 assets at NAS Oceana. Because of this, it would best meet each of the operational criteria, such as use of existing infrastructure, one-time costs, and life-cycle costs. Conversely, it would result in the greatest level of environmental impacts. These impacts would be related to land use, noise, air quality, and traffic around NAS Oceana, the most significant of these being noise. Noise exposure levels around the station would increase as a result of a 118% increase in airfield operations.

ARS 2 would realign the majority of the F/A-18 assets to NAS Oceana, and the remaining assets would go to MCAS Beaufort. It would maximize the use of existing capacity at MCAS Beaufort; however, new facilities would still need to be developed at NAS Oceana to support the majority of F/A-18 assets. As such, one-time costs and life-cycle costs would be higher than ARS 1. Environmental impacts at NAS Oceana would be only slightly less than under ARS 1 with noise impacts still being significant. At MCAS Beaufort, impacts resulting from ARS 2 would include an increase in noise exposure levels around the station as a result of a 40% increase in airfield operations as compared to 1997 levels.

ARS 3 would realign the majority of F/A-18 assets to NAS Oceana, and the remaining assets would go to MCAS Cherry Point. Similar to ARS 2, this would result in greater one-time and life-cycle costs than ARS 1. Impacts at MCAS Cherry Point would be limited to slight increases in noise exposure levels around the station as a result of an 18% increase in airfield operations as compared to 1997 levels. Environmental impacts at NAS Oceana would be slightly less than ARS 1 with noise impacts still being significant.

ARS 4 would split the F/A-18 assets between MCAS Beaufort and NAS Oceana. This would result in greater one-time and life-cycle costs as a result of construction of new facilities and duplication of some maintenance and training functions. Impacts at MCAS Beaufort would be greater than for ARS 2. Noise exposure levels would increase as a result of an 84% increase in operations compared to 1997 levels. NAS Oceana would have a 93% increase in operations compared to 1997 levels. Noise impacts would still be significant but less than under ARS 1.

ARS 5 would split the F/A-18 assets between MCAS Cherry Point and NAS Oceana. This would result in greater one-time and life-cycle costs as a result of construction of new

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
OPERATIONAL CRITERIA					
Consolidation of F/A-18 Fleet and FRS Squadrons to Maximize Operational Efficiency	All F/A-18 assets consolidated at NAS Oceana (11 F/A-18 fleet squadrons, the F/A-18 FRS, and all F/A-18 support functions). From an operational perspective, ARS 1 is clearly the best configuration of the Atlantic Fleet strike/fighter wing. It satisfies the Navy's need to replicate, to the greatest extent practicable, the operational characteristics currently existing at NAS Cecil Field. ARS 1 avoids the need to duplicate training/operational functions at multiple locations. It would also preserve training synergy (i.e., positive effects of having less experienced FRS aviators training with their more experienced fleet counterparts) by having all squadrons in one location.	Majority of assets sent to NAS Oceana (9 F/A-18 fleet squadrons plus FRS). Two F/A-18 fleet squadrons sent to MCAS Beaufort to train with Marine Corps F/A-18 counterparts. NAS Oceana would need to be set up as a centralized location for F/A-18 maintenance, training (i.e., flight simulator training), and supply, however, some aircraft intermediate maintenance department (AIMD) functions would need to duplicated at MCAS Beaufort, through supplementation of current Marine Corps F/A-18 facilities. Separated pilot training and deployment functions would require extra travel between NAS Oceana and MCAS Beaufort.	Majority of assets sent to NAS Oceana (8 F/A-18 fleet squadrons plus FRS). Three F/A-18 fleet squadrons sent to MCAS Cherry Point. NAS Oceana would need to be set up as a centralized location for F/A-18 maintenance, training (i.e., flight simulator training), and supply. However, given the absence of F/A-18 maintenance facilities at MCAS Cherry Point, intermediate aircraft maintenance functions would need to be duplicated at MCAS Cherry Point. Additionally, some simulation capability would have to be purchased and installed at MCAS Cherry Point. Separated pilot training and deployment functions would require extra travel between NAS Oceana and MCAS Cherry Point.	Six F/A-18 fleet squadrons and the FRS sent to NAS Oceana and five F/A-18 fleet squadrons sent to MCAS Beaufort. NAS Oceana and MCAS Beaufort would both provide F/A-18 maintenance, training (i.e., flight simulator training), and supply. At MCAS Beaufort, a new parallel runway would be required along with an AIMD and simulation capability. Separated pilot training and deployment functions would require extra travel between NAS Oceana and MCAS Beaufort.	Six F/A-18 fleet squadrons and the FRS sent to NAS Oceana and five F/A-18 fleet squadrons sent to MCAS Cherry Point. NAS Oceana and MCAS Cherry Point would both provide F/A-18 maintenance, training (i.e., flight simulator training), and supply. At MCAS Cherry Point, a new parallel runway would be required along with an AIMD, and expanded flight simulator capability. Separated pilot training and deployment functions would require extra travel between NAS Oceana and MCAS Cherry Point.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Maximization of the Use of Existing Excess Infrastructure	Of 11 hangar modules required to support 11 F/A-18 fleet squadrons and the FRS (i.e., one module for each fleet squadron and two modules for the FRS, minus two modules for two fleet squadrons that would be deployed at any time), NAS Oceana would fully utilize its existing 8 excess hangar modules. A new 3-module hangar would need to be constructed to satisfy hangar module deficiency. Additional infrastructure needs (i.e., maintenance, training, and personnel) would need to be met through twelve construction projects.	Excess hangar module capacity at MCAS Beaufort would be fully utilized by two fleet squadrons, although some minor hangar renovations would be needed. Hangar deficiency at NAS Oceana would be same as ARS 1, because the two fleet squadrons deployed would be those at MCAS Beaufort during a portion of deployment schedules. Therefore all facilities needed to support ARS 1 are also needed under ARS 2.	Excess hangar module capacity at MCAS Cherry Point would be fully utilized by three fleet squadrons, although some hangars would require renovation. In addition, new F/A-18 maintenance facilities would need to be constructed. Hangar deficiency at NAS Oceana would be slightly less than ARS 1, because the three fleet squadrons would be sent to MCAS Cherry Point during a portion of deployment schedules. Therefore, deficiency would be satisfied through the construction of a two-module hangar. All other facilities needed to support ARS 1 are also needed under ARS 3.	Excess hangar module capacity at MCAS Beaufort would be fully utilized. A new 3-module hangar would be constructed and an existing hangar would be renovated. A new parallel runway would be necessary to accommodate additional operations associated with five F/A-18 fleet squadrons. Infrastructure needs (i.e., maintenance, training, and personnel) would be met through 18 construction projects. At NAS Oceana, no new hangar modules would be required. Excess capacity would be fully utilized, although some minor hangar renovation would be needed.	Excess hangar capacity at MCAS Cherry Point would be fully utilized. A new 3-module hangar would be constructed and an existing hangar would be renovated. A new parallel runway would be necessary to accommodate additional operations associated with five F/A-18 fleet squadrons. Infrastructure needs (i.e., maintenance, training, and personnel) would be met through eight construction projects. At NAS Oceana, no new hangar modules would be required. Excess capacity would be fully utilized, although some minor hangar renovation would be needed.
One-Time Costs	$94 million	$105 million	$105 million	$240 million	$136 million
30-Year Life Cycle Costs	$250 million	$283 million	$440 million	$663 million	$519 million
Airfield Operations	118% increase in number of operations at NAS Oceana; 51% increase in operations at NALF Fentress. Increases would not affect efficiency of airfield operations under ARS 1.	40% increase in number of operations at MCAS Beaufort. Increases would not affect efficiency of airfield operations. 109% increase in number of operations at NAS Oceana; 43% increase in operations at NALF Fentress. Increases would not affect efficiency of airfield operations under ARS 2.	18% increase in number of operations at MCAS Cherry Point. Increases would not affect efficiency of airfield operations. 101% increase in number of operations at NAS Oceana; 42% increase in operations at NALF Fentress. Increases would not affect efficiency of airfield operations under ARS 3.	84% increase in number of operations at MCAS Beaufort. A new parallel runway would be required to complete operations without significantly affecting airfield operations. 93% increase in number of operations at NAS Oceana; 39% increase in operations at NALF Fentress. Increases would not affect efficiency of airfield operations.	26% increase in number of operations at MCAS Cherry Point. A new parallel runway would be required to complete operations without significantly affecting airfield operations. 93% increase in number of operations at NAS Oceana; 40% increase in operations at NALF Fentress. Increases would not affect efficiency of airfield operations.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Military Training Areas					
Military Training Routes (MTRs)	Overall changes would occur in utilization for various military training routes (MTRs). Sorties along all MTRs would grow from 7,840 to 8,688 total sorties; this increase would not exceed capacity; noise levels under any one segment generally remain the same or decrease.	No significant increase in utilization or noise levels under MTRs in the vicinity of MCAS Beaufort; total utilization for MTRs near NAS Oceana under ARS 2 would grow from 7,840 to 8,576 sorties; this increase would not exceed capacity; noise levels under any one segment generally remain the same or decrease.	MTRs in the vicinity of MCAS Cherry Point would be the same as those at NAS Oceana; total utilization along all MTRs under ARS 3 would grow from 7,840 to 8,577 sorties; uses at MTRs would not exceed capacity; noise levels under any one segment generally remain the same or decrease.	No significant increase in utilization or noise levels under MTRs in the vicinity of MCAS Beaufort; total utilization for MTRs near NAS Oceana under ARS 4 would grow from 7,840 to 8,598 sorties; this increase would not exceed capacity; noise levels under any one segment generally remain the same or decrease.	MTRs in the vicinity of MCAS Cherry Point would be the same as those at NAS Oceana; total utilization along all MTRs under ARS 5 would grow from 7,840 to 8,587 sorties; uses at MTRs would not exceed capacity; noise levels under any one segment generally remain the same or decrease.
Warning Areas	Overall changes would occur in utilization for various warning areas. These airspace components are not scheduled, therefore, capacity to support increases would not be applicable. All warning areas are over water and primarily involve high altitude air-to-air combat training.	No significant increase would occur in utilization of warning areas in the vicinity of MCAS Beaufort; changes in utilization for various warning areas near NAS Oceana would occur.	MCAS Cherry Point and NAS Oceana would use the same warning areas; changes in utilization for various warning areas would occur; as under ARS 1.	No significant increase would occur in utilization of warning areas in the vicinity of MCAS Beaufort; changes in utilization of warning areas would occur near NAS Oceana; as under ARS 1.	MCAS Cherry Point and NAS Oceana would use the same warning areas; changes in utilization of warning areas near NAS Oceana would occur; as under ARS 1.
Military Operating Areas (MOAs)	No significant changes would occur in utilization of MOAs.	No significant change would occur in utilization of MOAs.	No significant change would occur in utilization of MOAs.	No significant change would occur in utilization of MOAs.	No significant change would occur in utilization of MOAs.
Restricted Areas	Overall increases in utilization for restricted areas would be less than 1%, use would not exceed capacity; noise levels remain unchanged.	No significant increase would occur in utilization or noise levels in restricted areas in eastern Georgia; increases in utilization for restricted areas near NAS Oceana under ARS 2 would occur; use would not exceed capacity; noise levels remain unchanged.	Restricted areas near MCAS Cherry Point would be the same as those at NAS Oceana; increases in utilization for restricted areas would occur; use would not exceed capacity; noise levels remain unchanged.	No significant increase would occur in utilization or noise levels in restricted areas in eastern Georgia; increases in utilization for restricted areas near NAS Oceana under ARS 4 would occur; use would not exceed capacity; noise levels remain unchanged.	Restricted areas near MCAS Cherry Point would be the same as those at NAS Oceana; increases in utilization for restricted areas would occur; use would not exceed capacity; noise levels remain unchanged.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Target Ranges	Increase in the use of BT-9 (41%), BT-11 (34%), and Dare County Range (27%); use would not exceed capacity. Minimal to no impacts would occur on noise levels, land use, water quality, aquatic resources, air quality, or terrestrial resources (Dare County Range only) at these ranges.	Slight increase in use of Townsend Range, use would not exceed capacity. No significant impacts would occur to noise levels, land use, water quality, terrestrial resources, or air quality at Townsend Range. Increase in the use of BT-9 (29%), BT-11 (31%), and Dare County Range (24%) under ARS 2; use would not exceed capacity. Minimal to no impacts would occur on noise levels, land use, water quality, aquatic resources, air quality, or terrestrial resources (Dare County Range only) at these ranges.	Target ranges in the vicinity of MCAS Cherry Point would be the same as those for NAS Oceana. Increase in the use of BT-9 (33%), BT-11 (32%), and Dare County Range (24%); use would not exceed capacity. Minimal to no impacts would occur on noise levels, land use, water quality, aquatic resources, air quality, or terrestrial resources (Dare County Range only) at these ranges.	Increase in use of Townsend Range; use would not exceed capacity. No significant impacts would occur to noise levels, land use, water quality, terrestrial resources, or air quality at Townsend Range. Increase in the use of BT-9 (16%), BT-11 (19%), and Dare County Range (18%) under ARS 4; use would not exceed capacity. Minimal to no impacts would occur on noise levels, land use, water quality, aquatic resources, air quality, or terrestrial resources (Dare County Range only) at these ranges.	Target ranges in the vicinity of MCAS Cherry Point would be the same as those for NAS Oceana. Increase in the use of BT-9 (37%), BT-11 (32%), and Dare County Range (33%); use would not exceed capacity. Minimal to no impacts would occur on noise levels, land use, water quality, aquatic resources, air quality, or terrestrial resources (Dare County Range only) at these ranges.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
ENVIRONMENTAL EFFECTS					
Land Use	On-base construction would not directly impact land uses in the vicinity of NAS Oceana. Increases in aircraft operations would result in expansion and reconfiguration of APZs around the airfield. An additional 22,264 acres (9,010 hectares) of land would be exposed to significant aircraft noise levels (i.e., Noise Zones 2 and 3) compared to the 1978 AICUZ Program. This would result in indirect land use impacts in these areas associated with local policies on development in APZs and aircraft noise zones.	No direct impacts to land uses would occur as a result of construction at MCAS Beaufort. However, APZs would expand 2,372 acres (939 hectares) and an additional 7,054 acres (2,855 hectares) would be within Noise Zones 2 and 3 compared to the 1994 AICUZ program. About 732 acres (296 hectares) would have less noise exposure. This would result in indirect land use impacts in these areas associated with local policies on development in APZs and aircraft noise zones. Direct impacts at NAS Oceana under ARS 2 would be similar to ARS 1, however of a slightly lesser intensity. An additional 18,971 acres (7,678 hectares) would be in Noise Zones 2 and 3 as compared to the 1978 AICUZ Program; this is considered a significant impact. About 5,472 acres (2,215 hectares) would have less noise exposure.	No direct impacts to land uses would occur as a result of construction at MCAS Cherry Point. APZs would expand approximately 2,789 acres (1,127 hectares) and an additional 3,120 acres (1,263 hectares) would be in Noise Zones 2 and 3 compared to the 1988 AICUZ Program. About 779 acres (315 hectares) would have less noise exposure. This would not result in indirect impacts to development; communities around the station do not control land use in noise zones. Direct impacts at NAS Oceana under ARS 3 would be similar to ARS 1, however, of a slightly lesser intensity. APZs would be slightly less than ARS 1, and the same as ARS 2. An additional 17,930 acres (7,509 hectares) would be in Noise Zones 2 and 3 compared to the 1978 AICUZ Program; this is considered a significant impact. About 5,995 acres (2,427 hectares) would have less noise exposure.	Long term land use changes would occur as a result of new construction projects at MCAS Beaufort, particularly the new runway. APZs would expand 1,134 acres (458 hectares) and an additional 9,729 acres (4,011 hectares) would be in Noise Zones 2 and 3 compared to the 1994 AICUZ Program. About 931 acres (377 hectares) would have less noise exposure. This would result in indirect land use impacts in these areas associated with local policies on development in APZs and aircraft noise zones. Direct impacts at NAS Oceana under ARS 4 would be similar to ARS 1, however, of a slightly lesser intensity. APZs would be slightly less than ARS 1, and the same as ARS 2 and 3. An additional 15,874 acres (6,424 hectares) would be in Noise Zones 2 and 3 compared to the 1978 AICUZ Program; this is considered a significant impact. About 7,407 acres (2,998 hectares) would have less noise exposure.	Long term land use changes would occur as a result of new construction projects at MCAS Cherry Point, particularly the new parallel runway. APZs would decrease by 311 acres (125 hectares) and an additional 4,869 acres (1,971 hectares) would be in Noise Zones 2 and 3 compared to the 1988 AICUZ Program. About 708 acres (286 hectares) would have less noise exposure. This would not result in indirect impacts to development; communities around the station do not control land use in noise zones. Direct impacts at NAS Oceana under ARS 3 would be similar to ARS 1, however, of a slightly lesser intensity. APZs would be slightly less than ARS 1, and the same as ARS 2, 3, and 4. An additional 16,476 acres (6,668 hectares) would be in Noise Zones 2 and 3 compared to the 1978 AICUZ Program; this is considered a significant impact. About 7,035 acres (2,847 hectares) would have less noise exposure.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Socioeconomics and Community Services	ARS 1 would directly transfer 4,200 military/civilians to NAS Oceana. When other on-going personnel movements are considered, would result in a net increase of 5,600 military/civilian positions at NAS Oceana, would increase regional population by 12,500 (military/civilian personnel and dependents); 2,710 school age children; $226 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services. Potential shortfall for on-base BEQ at NAS Oceana.	Transfer of 500 military personnel to MCAS Beaufort, would increase regional population by 1,110 (military personnel and dependents); 210 school age children; $20 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services. Potential shortfall for on-base family housing at MCAS Beaufort. ARS 2 would directly transfer 3,700 military/civilians to NAS Oceana. When other on-going personnel movements are considered, would result in a net increase of 5,100 military/civilian positions at NAS Oceana, would increase regional population by 11,390 (military/civilian personnel and dependents); 2,470 school age children; $205 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services in the vicinity of NAS Oceana.	Transfer of 800 military personnel to MCAS Cherry Point, would increase regional population by 1,750 (military personnel and dependents); 360 school age children; $30 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services. Potential shortfall for on-base family housing at MCAS Cherry Point. ARS 3 would directly transfer 3,500 military/civilians to NAS Oceana. When other on-going personnel movements are considered, would result in a net increase of 4,900 military/civilian positions at NAS Oceana, would increase regional population by 10,950 (military/civilian personnel and dependents); 2,360 school age children; $198 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services in vicinity of NAS Oceana.	Transfer of 1,300 military personnel to MCAS Beaufort, would increase regional population by 2,900 (military personnel and dependents); 600 school age children; $50 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services. Proposed new family housing relieves potential shortfall for on-base family housing at MCAS Beaufort. ARS 4 would directly transfer 3,000 military/civilians to NAS Oceana. When other on-going personnel movements are considered, would result in a net increase of 4,400 military/civilian positions at NAS Oceana, would increase regional population by 9,850 (military/civilian personnel and dependents); 2,120 school age children; $125 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services in the vicinity of NAS Oceana.	Transfer of 1,300 military personnel to MCAS Cherry Point, would increase regional population by 2,900 (military personnel and dependents); 600 school age children; $50 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services. Potential shortfall for on-base family housing at MCAS Cherry Point. ARS 5 would directly transfer 3,000 military/civilians to NAS Oceana. When other on-going personnel movements are considered, would result in a net increase of 4,400 military/civilian positions at NAS Oceana, would increase regional population by 9,850 (military/civilian personnel and dependents); 2,120 school age children; $125 million influx to regional economy through payroll expenditures. No significant impact to regional housing or community services in vicinity of NAS Oceana.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Infrastructure	Adequate capacity and no significant impacts to wastewater, stormwater, solid waste management systems, electrical, heating, and jet fuel supply systems on-base or off-base of NAS Oceana. Water demand could potentially strain water supply in the City of Virginia Beach. Completion of Lake Gaston project to alleviate city water shortages.	Adequate capacity and no significant impacts to water supply, wastewater, stormwater, solid waste management systems, electrical, heating, and jet fuel supply systems on-base or off-base of MCAS Beaufort. Direct impacts at NAS Oceana under ARS 2 similar to ARS 1.	Adequate capacity and no significant impacts to water supply, wastewater, stormwater, or solid waste management systems, electrical, heating, and jet fuel supply systems on-base or off-base of MCAS Cherry Point. Direct impacts at NAS Oceana under ARS 3 similar to ARS 1.	Adequate capacity and no significant impacts to water supply, stormwater, or solid waste management systems, electrical, and heating systems on-base or off-base of MCAS Beaufort. New construction would require some utility extensions. Proposed construction of wastewater treatment plant expansion at Laurel Bay Family Housing Area would alleviate potential impacts on wastewater treatment capacity. Construction of aircraft refueling system near proposed 3-module hangar would alleviate potential deficiencies in jet fueling system on-base. Direct impacts at NAS Oceana under ARS 4 similar to ARS 1, although less quantities of service would be required.	Adequate capacity and no significant impacts to water supply, wastewater, stormwater, solid waste management systems, electrical, heating, and jet fuel supply systems on-base or off-base of MCAS Cherry Point. New construction would require some utility extensions. Direct impacts at NAS Oceana under ARS 5 similar to ARS 1, although less quantities of service would be required.
Transportation	Approximately 7,000 new trips generated. Significant impact to LOS on Oceana Boulevard, however, proposed roadway improvements would reduce this impact. On station, some degradation of LOS on road segments and at intersections would occur.	Approximately 1,000 new trips would be generated to MCAS Beaufort. No significant impact to LOS in the vicinity of MCAS Beaufort. Direct impacts at NAS Oceana under ARS 2 similar to ARS 1.	Approximately 1,600 new trips would be generated to MCAS Cherry Point. No significant impact to LOS in the vicinity of MCAS Cherry Point. Direct impacts at NAS Oceana under ARS 3 similar to ARS 1.	Approximately 2,600 new trips would be generated to MCAS Beaufort. No significant impact to LOS in the vicinity of MCAS Beaufort. Direct impacts at NAS Oceana under ARS 4 similar to ARS 1, but to a lesser degree.	Approximately 2,600 new trips would be generated to MCAS Cherry Point. Significant impact to Fontana Road and U.S. 70; Navy will coordinate with NCDOT. Direct impacts at NAS Oceana under ARS 5 similar to ARS 1, but to a lesser degree.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Noise	Land area near NAS Oceana covered by 65 to 75 dB Ldn would total 34,623 acres (14,011 hectares) and contain 78,687 persons. New areas (compared to corresponding AICUZ contour) within this contour would total 13,821 acres (5,593 hectares) and contain 22,875 persons. These impacts are considered significant. Land area near NAS Oceana covered by 75 dB and greater Ldn would total 28,191 acres (11,409 hectares) and contain 51,544 persons. New areas within this contour (compared to corresponding AICUZ contour) would total 8,443 acres (3,417 hectares) and contain 16,108 persons. These impacts are considered significant. About 3,088 acres (1,250 hectares) and 1,995 persons in the existing 65 to 75 dB contours would have less noise exposure. About 1,384 acres (560 hectares) and 8,350 persons in the existing 75+dB contour would have less noise exposure. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 6 to 22 dB increase over existing conditions.	Land area near MCAS Beaufort covered by 65 to 75 dB Ldn would total 11,235 acres (4,547 hectares) and contain 3,816 persons. New areas within this contour (compared to 1994 AICUZ contour) would total 4,983 acres (2,017 hectares) and contain 1,659 persons. About 409 acres (166 hectares) and 146 persons in the existing 65 to 75 dB would have less noise exposure (<65 dB). Land area near MCAS Beaufort covered by 75 dB and greater Ldn would total 2,776 acres (1,123 hectares) and contain 859 persons. New areas within this contour (compared to 1994 AICUZ contour) would total 2,071 acres (838 hectares) and contain 644 persons. About 323 acres (131 hectares) and 104 persons would have less noise exposure (65-75 dB Ldn). There are no schools near MCAS Beaufort that would be affected by increased noise levels. Direct impacts at NAS Oceana under ARS 2 would be slightly less than ARS 1, but would still be considered significant. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 21 dB increase over existing conditions.	Land area near MCAS Cherry Point covered by 65 to 75 dB Ldn would total 7,290 acres (2,950 hectares) and contain 2,988 persons. New areas within this contour (compared to 1988 AICUZ contour) would total 2,883 acres (1,166 hectares) and contain 1,746 persons. About 700 acres (283 hectares) and 60 persons in the existing 65 to 75 dB Ldn would have less noise exposure (<65 dB). Land area near MCAS Cherry Point covered by 75 dB and greater Ldn would total 493 acres (200 hectares) and contain 293 persons. New areas within this contour (compared to 1988 AICUZ contour) would total 237 acres (96 hectares) and contain 235 persons. About 79 acres (32 hectares) and 7 persons in the existing 75 dB or greater Ldn would have less noise exposure (65-75 dB Ldn). Four schools would continue to be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 1 to 4 dB increase over existing conditions. Direct impacts at NAS Oceana under ARS 3 would be slightly less than ARS 1, but would still be considered significant. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions.	Land area near MCAS Beaufort covered by 65 to 75 dB Ldn would total 12,894 acres (5,220 hectares) and contain 4,295 persons. New areas within this contour (compared to 1994 AICUZ contour) would total 6,882 acres (2,786 hectares) and contain 2,236 persons. About 532 acres (215 hectares) and 163 persons in the existing 65 to 75 dB Ldn would have less noise exposure (<65 dB). Land area near MCAS Beaufort covered by 75 dB and greater Ldn would total 3,025 acres (1,225 hectares) and contain 942 persons. New areas within this contour (compared to 1994 AICUZ contour) would total 2,847 acres (1,152 hectares) and contain 891 persons. About 399 acres (162 hectares) and 170 persons would have less noise exposure (65-75 dB Ldn). There are no schools near MCAS Beaufort that would be affected by increased noise levels. Direct impacts at NAS Oceana under ARS 4 would be less than ARS 1, but would still be considered significant. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions.	Land area near MCAS Cherry Point covered by 65 to 75 dB would total 8,722 acres (3,531 hectares) and contain 3,984 persons. New areas within this contour (compared to 1988 AICUZ contour) would total 4,449 acres (1,801 hectares) and contain 2,868 persons. About 641 acres (259 hectares) and 55 persons in the existing 65 to 75 dB Ldn would have less noise exposure (<65 dB). Land area near MCAS Cherry Point covered by 75 dB and greater Ldn would total 697 acres (282 hectares) and contain 441 persons. New areas within this contour (compared to 1988 AICUZ contour) would total 420 acres (170 hectares) and contain 364 persons. About 67 acres (27 hectares) and 6 persons would have less noise exposure (65 - 75 dB Ldn). Four schools would continue to be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 1 to 5 dB increase over existing conditions. Direct impacts at NAS Oceana under ARS 5 would be less than ARS 1, but would still be considered significant. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Air Quality	Projected net annual emissions of nonattainment ozone precursors: would be 105 tons of VOCs and 396 tons of NOx. The net change in emissions was included in the emissions budget within the Ozone Maintenance Plan for the Hampton Roads region. Therefore, emissions associated with ARS 1 would conform to Virginia State Implementation Plan (SIP).	No significant impact to air quality in the vicinity of MCAS Beaufort; attainment status for all criteria pollutants in South Carolina would not be impacted by ARS 2. Therefore, ARS 2 would conform to the South Carolina SIP. Projected net change in annual emissions of nonattainment ozone precursors at NAS Oceana would be 70 tons of VOCs and 320 tons of NOx. The net change in emissions was included in the mobile emissions budget within the Ozone Maintenance Plan for the Hampton Roads region. Therefore emissions associated with ARS 2 would conform to Virginia SIP.	No significant impact to air quality in the vicinity of MCAS Cherry Point; attainment status for all criteria pollutants in vicinity of MCAS Cherry Point would not be impacted by ARS 3. Therefore, ARS 3 would conform to the North Carolina SIP. Projected net change in annual emissions of nonattainment precursors at NAS Oceana would be 52 tons of VOCs and 299 tons of NOx. The net change in emissions was included in the mobile emissions budget within the Ozone Maintenance Plan for the Hampton Roads region. Therefore emissions associated with ARS 3 would conform to Virginia SIP.	No significant impact to air quality in the vicinity of MCAS Beaufort; attainment status for all criteria pollutants in South Carolina would not be impacted by ARS 4. Therefore, ARS 4 would conform to the South Carolina SIP. Projected net change in annual emissions of nonattainment ozone precursors at NAS Oceana would be 20 tons of VOCs and 267 tons of NOx. The net change in emissions was included in the mobile emissions budget within the Ozone Maintenance Plan for the Hampton Roads region. Therefore emissions associated with ARS 4 would conform to Virginia SIP.	No significant impact to air quality in the vicinity of MCAS Cherry Point; attainment status for all criteria pollutants in vicinity of MCAS Cherry Point would not be impacted by ARS 5. Therefore, ARS 5 would conform to the North Carolina SIP. Projected net change in annual emissions of nonattainment precursors at NAS Oceana would be 24 tons of VOCs and 269 tons of NOx. The net change in emissions was included in the mobile emissions budget within the Ozone Maintenance Plan for the Hampton Roads region. Therefore emissions associated with ARS 5 would conform to Virginia SIP.
Topography, Geology, and Soils	Minor impact would result from short-term construction activities.	Minor impact at MCAS Beaufort would result from short-term construction activities. Direct impacts at NAS Oceana under ARS 2 would be similar to ARS 1.	Minor impact at MCAS Cherry Point would result from short-term construction activities. Direct impacts at NAS Oceana under ARS 3 would be similar to ARS 1.	Impact to soils at MCAS Beaufort would result from short-term construction activities. Direct impacts at NAS Oceana under ARS 4 would be similar to ARS 1, although less construction would occur.	Impact to soils at MCAS Cherry Point would result from short-term construction activities. Direct impacts at NAS Oceana under ARS 5 would be similar to ARS 1, although less construction would occur.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Water Resources	Minor impact would result from short-term construction activities. Potential for minor wetland impacts associated with hangar construction. Stormwater runoff would be mitigated by best management practices and possible amendment to Station's VPDES permit.	Minor impact at MCAS Beaufort would result from short-term construction activities. Stormwater runoff would be mitigated by adherence to South Carolina stormwater management guidelines. Direct impacts at NAS Oceana under ARS 2 would be similar to ARS 1.	Minor impact at MCAS Cherry Point would result from short-term construction activities. Stormwater runoff would be mitigated by adherence to station's stormwater pollution prevention plan. Direct impacts at NAS Oceana under ARS 3 would be similar to ARS 1.	Impacts at MCAS Beaufort would result from short-term construction activities, and increase in impervious surfaces, particularly with the proposed parallel runway. Stormwater runoff would be mitigated by adherence to South Carolina stormwater management guidelines. Expansion of wastewater treatment plant would require amendment to NPDES permit. Direct impacts at NAS Oceana under ARS 4 would be similar to ARS 1, although less impervious surface would be constructed	Impacts at MCAS Cherry Point would result from short-term construction activities, and increase in impervious surfaces, particularly with the proposed parallel runway. Stormwater runoff would be mitigated by adherence to station's stormwater pollution prevention plan. Direct impacts at NAS Oceana under ARS 5 would be similar to ARS 1, although less impervious surface would be constructed.
Terrestrial Environment	Minimal loss of vegetation/wildlife habitat would occur due to construction on previously disturbed sites at NAS Oceana. No impact would occur to threatened/endangered species habitat.	Minimal loss of vegetation/wildlife habitat would occur at MCAS Beaufort due to construction on previously disturbed sites. No loss of wetlands or threatened/endangered species habitat would occur. Direct impacts at NAS Oceana under ARS 2 would be similar to ARS 1.	Minimal loss of vegetation/wildlife habitat at MCAS Cherry Point due to construction on previously disturbed sites. No loss of wetlands, forest resources, or threatened/endangered species habitat would occur at MCAS Cherry Point. Direct impacts at NAS Oceana under ARS 3 would be similar to ARS 1.	Loss of 95 acres (38 hectares) of wetlands at MCAS Beaufort. No impact to threatened/endangered species habitat. Direct impacts at NAS Oceana under ARS 4 would be similar to ARS 1, although less construction would occur.	Loss of 45 acres (18 hectares) of wetlands at MCAS Cherry Point. Potential impact to threatened/endangered species habitat; consultation with USFWS required. Direct impacts at NAS Oceana under ARS 5 would be similar to ARS 1, although less construction would occur.

Table 2.5-1

COMPARISON OF ALTERNATIVE REALIGNMENT SCENARIOS

	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Cultural Resources	No sites listed or potentially-eligible for listing on the NRHP would be within any of the proposed project areas at NAS Oceana.	No sites listed or potentially-eligible for listing on the NRHP would be within any of the proposed project areas at MCAS Beaufort. No impacts at NAS Oceana under ARS 2.	No sites listed or potentially-eligible for listing on the NRHP would be within any of the proposed project areas at MCAS Cherry Point. No impacts at NAS Oceana under ARS 3.	Consultation with the South Carolina SHPO required for project areas. No impacts to NAS Oceana under ARS 4.	Consultation with the North Carolina SHPO required for project areas. No impacts at NAS Oceana under ARS 5.
Environmental Contamination	Hazardous waste generation would increase by an estimated 41% over wastes generated in 1995 at NAS Oceana. Two areas of environmental contamination are located near proposed sites of construction; however, construction would not be impacted by remediation activity.	Hazardous waste generation would increase by an estimated 7% over wastes generated in 1995 at MCAS Beaufort; no impacts to hazardous waste management would occur under ARS 2. No areas of environmental contamination are located near proposed sites of construction at MCAS Beaufort. Direct impacts at NAS Oceana under ARS 2 would be similar to ARS 1.	Hazardous waste generation would increase by an estimated 1% over wastes generated in 1995 at MCAS Cherry Point; no impacts to hazardous waste management would occur under ARS 3. Remedial activity at areas of environmental contamination near proposed sites of construction at MCAS Cherry Point would not be impacted by the proposed action. Direct impacts at NAS Oceana under ARS 3 would be similar to ARS 1.	Hazardous waste generation would increase by an estimated 18% over wastes generated in 1995 at MCAS Beaufort; no impacts to hazardous waste management would occur under ARS 4. No areas of environmental contamination are located near proposed sites of construction at MCAS Beaufort. Direct impacts at NAS Oceana under ARS 4 would be similar to ARS 1	Hazardous waste generation would increase by less than 1% over wastes generated in 1995 at MCAS Cherry Point; no impacts to hazardous waste management would occur under ARS 5. Remedial activity at areas of environmental contamination near proposed sites of construction at MCAS Cherry Point would not be impacted by the proposed action. Direct impacts at NAS Oceana under ARS 5 would be similar to ARS 1
Environmental Justice	Impacts of this alternative would not disproportionately affect minority or low-income populations.	Impacts of this alternative would not disproportionately affect minority or low-income populations.	Impacts of this alternative would not disproportionately affect minority or low-income populations.	Impacts of this alternative would not disproportionately affect minority or low-income populations.	Impacts of this alternative would not disproportionately affect minority or low-income populations.

Table 2.5-2

COMPARISON OF AREA OFF-STATION AND/OR POPULATION AFFECTED BY NOISE AND APZs NAS OCEANA AND NALF FENTRESS

	Noise				APZ		
	65-75 dB		75+ dB		Clear Zone	APZ 1	APZ 2
	Area	People	Area	People	Area	Area	Area
1978 AICUZ	31,214 (12,632)	66,123	20,361 (8,240)	42,445	82 (33)	1,697 (687)	6,724 (2,721)
1997	13,293 (5,380)	33,545	4,949 (2,003)	1,295	82 (33)	1,967 (796)	6,601 (2,671)
ARS 1	34,623 (14,011)	78,687	28,191 (11,409)	51,544	82 (33)	2,695 (1,091)	7,890 (3,193)
ARS 2	33,094 (13,393)	77,241	26,695 (10,803)	48,406	82 (33)	2,695 (1,091)	7,624 (3,085)
ARS 3	32,274 (13,061)	76,605	26,299 (10,643)	47,113	82 (33)	2,695 (1,091)	7,624 (3,085)
ARS 4	30,714 (12,430)	74,368	25,296 (10,237)	44,508	82 (33)	2,695 (1,091)	7,624 (3,085)
ARS 5	31,053 (12,567)	74,990	25,628 (10,372)	45,098	82 (33)	2,695 (1,091)	7,624 (3,085)

Note: Numbers exclude water area.

Key:

Area = Acres (hectares).
dB = Decibel.

Source: Wyle Labs 1997.

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Table 2.5-3

COMPARISON OF OFF-STATION AREA AND/OR POPULATION AFFECTED BY NOISE AND APZs
MCAS BEAUFORT

	Noise				APZ		
	65-75 dB		75+ dB		Clear Zone	APZ 1	APZ 2
	Area	People	Area	People	Area	Area	Area
1994 AICUZ	8,409 (3,403)	2,847	1,028 (416)	317	18 (7)	689 (279)	2,511 (1,016)
1997	9,938 (4,022)	3,440	1,190 (48)	362	18 (7)	328 (133)	1,435 (581)
ARS 1	—	—	—	—	—	—	—
ARS 2	11,235 (4,547)	3,816	2,776 (1,123)	859	18 (7)	1,373 (556)	4,243 (1,717)
ARS 3	—	—	—	—	—	—	—
ARS 4	12,894 (5,218)	4,295	3,025 (1,224)	942	27 (11)	1,258 (509)	2,197 (889)
ARS 5	—	—	—	—	—	—	—

Note: Numbers exclude water area.

Key:

Area = Acres (hectares)
dB = Decibel.

Source: Wyle Labs 1997.

Table 2.5-4

COMPARISON OF OFF-STATION AREA AND/OR POPULATION AFFECTED BY NOISE AND APZs MCAS CHERRY POINT

	Noise				APZ		
	65-75 dB		75+ dB		Clear Zone	APZ 1	APZ 2
	Area	People	Area	People	Area	Area	Area
1988 AICUZ	5,265 (2,130)	1,529	321 (130)	29	5 (2)	923 (374)	2,618 (1,060)
1997	5,235 (2,119)	1,994	196 (79)	125	17 (7)	716 (290)	1,668 (675)
ARS 1	—	—	—	—	—	—	—
ARS 2	—	—	—	—	—	—	—
ARS 3	7,290 (2,950)	2,988	493 (200)	293	17 (7)	1,264 (51)	3,702 (150)
ARS 4	—	—	—	—	—	—	—
ARS 5	8,722 (3,530)	3,984	697 (282)	441	17 (7)	962 (389)	2,065 (836)

Note: Numbers exclude water area.

Key:

Area = Acres (hectares)
dB = Decibel.

Source: Wyle Labs 1997.

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facilities and duplication of some maintenance and training functions. Impacts at MCAS Cherry Point would be greater than for ARS 3. Noise exposure levels would increase as a result of a 26% increase in operations compared to 1997 levels. NAS Oceana would have a 93% increase in operations compared to 1997 levels. Noise impacts would still be significant but less than under ARS 1.

2.6 Alternatives Considered but Eliminated from Detailed Analysis

2.6.1 No-Action Alternative

The no-action alternative would result in no relocation of F/A-18 aircraft from NAS Cecil Field. This alternative is not reasonable because the closure of NAS Cecil Field, and thus the realignment of its assets to other installations, is mandated by BRAC. As a result, the no-action alternative will not be discussed further.

2.6.2 Single-Siting at MCAS Cherry Point

One alternative that was considered and eliminated from further analysis in this DEIS involved transferring all F/A-18 fleet squadrons and the FRS to MCAS Cherry Point as was considered under the 1993 BRAC mandates. Implementing this alternative would require substantial construction and would leave substantial unused capacity at NAS Oceana. The 1995 BRAC Commission redirected F/A-18 aircraft that were to be transferred to MCAS Cherry Point under the 1993 BRAC mandates to other naval air stations with "the necessary capacity and support infrastructure." The primary intent of this change was to maximize the use of excess capacity at east coast Navy and Marine Corps air stations, and to avoid substantial new construction that would have been required at MCAS Cherry Point to accommodate all F/A-18 fleet and FRS aircraft from NAS Cecil Field (BRAC Commission 1995).

Hangar space at MCAS Cherry Point associated with the 1993 BRAC realignment scenario was going to be provided through the use of existing hangar modules and the construction of a new hangar complex along Runway 19 (see Figure 2.6-1). This alternative has been reevaluated and updated to account for current personnel and aircraft levels and available infrastructure assets. The demolition and construction associated with the new hangar facilities would result in significant additional construction. Additional personnel support, recreation, medical, and training facilities also would be required to accommodate all F/A-18 aircraft (LANTDIV 1997b). A new OLF also would be required. The total one-time costs to complete these projects would exceed $300 million (LANTDIV 1997b) and would also leave significant unused capacity at NAS Oceana.

Therefore, transferring all F/A-18 aircraft to MCAS Cherry Point clearly does not meet the intent of BRAC or the specific recommendation of the 1995 BRAC Commission, which is to relocate aircraft to installations with the necessary capacity and support infrastructure. Consequently, while transferring some F/A-18 aircraft to MCAS Cherry Point

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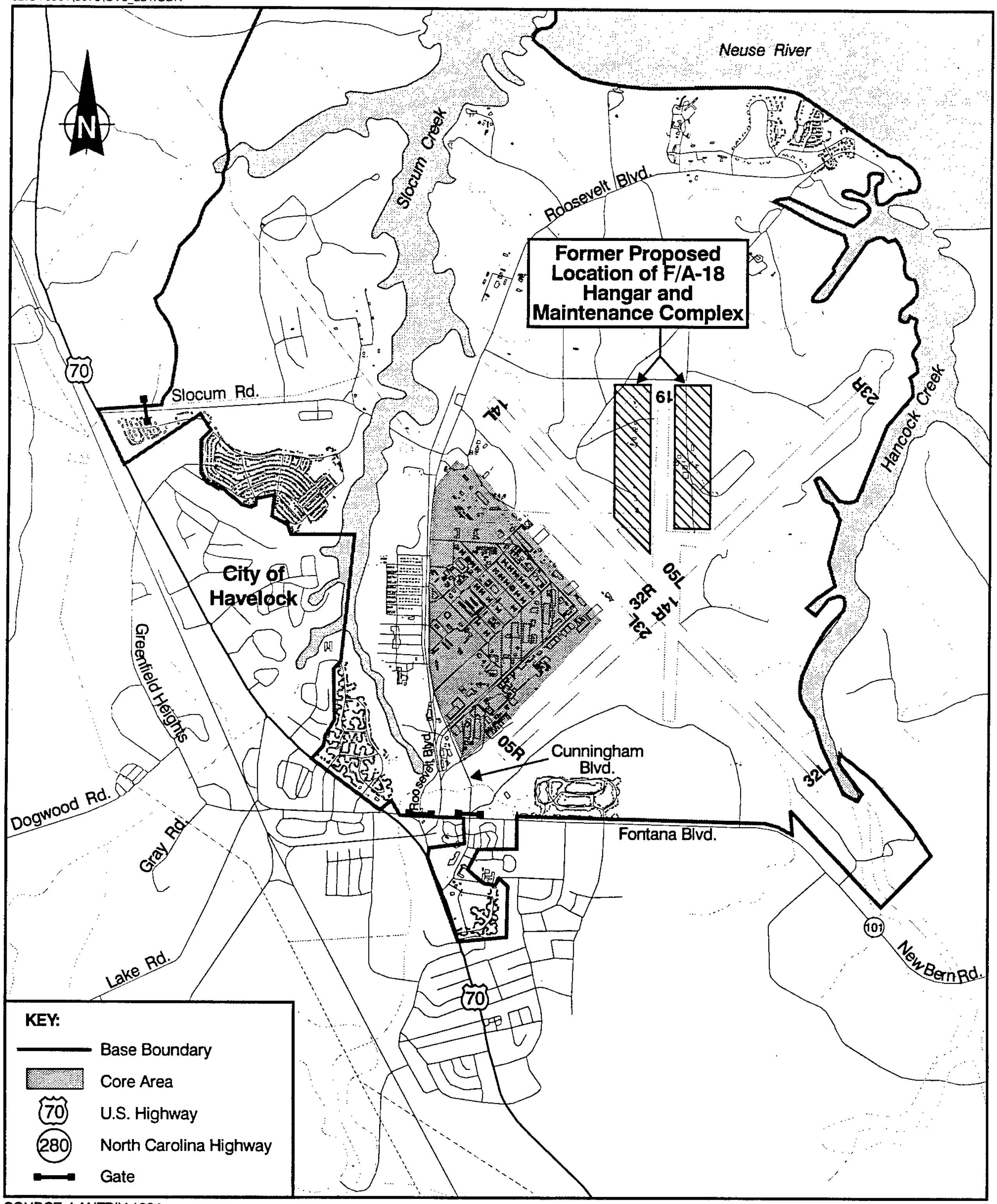

SOURCE: LANTDIV 1994

SCALE

0 1,183 2,366 Meters

0 3,881 7,762 Feet

Figure 2.6-1 LOCATION OF NEW AIRCRAFT HANGAR AND MAINTENANCE COMPLEX AT MCAS CHERRY POINT PROPOSED UNDER BRAC 1993

may be reasonable, transferring all F/A-18 fleet and FRS aircraft is not possible without implementation of a major construction program. Further, this alternative leaves significant unused capacity at NAS Oceana, which is not consistent with the BRAC 1995 goal of using existing capacity and infrastructure to the greatest extent possible. Therefore, this alternative was removed from further consideration.

2.6.3 Single-Siting at MCAS Beaufort

An alternative that involved transferring all F/A-18 fleet squadrons and the FRS to MCAS Beaufort was considered and eliminated from further analysis. As at MCAS Cherry Point, implementing this alternative would require substantial construction and would leave significant unused capacity at NAS Oceana. Because excess hangar and apron capacity at MCAS Beaufort could only support two fleet squadrons of F/A-18 aircraft, new hangar construction, as well as significant parking apron expansion, would be required (LANTDIV 1997c). In addition, given that Marine Corps F/A-18 maintenance facilities are often deployed as mobile facilities, a permanent AIMD facility for Navy F/A-18 would need to be developed at the station. The total construction cost associated with this alternative would exceed $400 million and would leave significant unused capacity at NAS Oceana.

Given the substantial number of new facilities that would be required in transferring all F/A-18 fleet and FRS aircraft to MCAS Beaufort and the significant unused capacity at NAS Oceana that would result, this alternative would not be consistent with the BRAC 1995 goal of using existing infrastructure to the greatest extent possible. Therefore, this alternative was removed from further consideration.

2.6.4 Relocating F/A-18 Aircraft to Three Locations

This alternative involves maximizing the use of excess hangar and parking apron capacity at MCAS Cherry Point (three fleet squadrons) and MCAS Beaufort (two fleet squadrons) while sending the remaining F/A-18 assets (six fleet squadrons and the FRS [or eight to nine fleet squadrons depending on the aircraft distribution among the three installations]) to NAS Oceana. Triple-site alternatives do not meet F/A-18 operational considerations listed in Section 2.1 and are considered unacceptable because of the unsupportable requirements associated with maintaining, training, and operating F/A-18 assets in multiple locations (LANTDIV 1997a; COMNAVAIRLANT 1996a; 1997). Projects listed under ARSs 1, 2, and 3 would be needed at each installation to implement this alternative. The one-time costs associated with this construction would be almost $101 million (LANTDIV 1997a). Life-cycle costs over a 30-year period would exceed $452 million dollars (LANTDIV 1997a).

In terms of aircraft maintenance and readiness, limited resources often require fleet squadrons to support other fleet squadrons closer to deployment. This support typically comes in the form of critical spare parts and personnel augmentation for certain specific critical taskings. Relocating F/A-18 aircraft to three locations would severely constrain the ability of fleet squadrons to perform these functions.

The operational criteria discussed in Section 2.1 raise four primary issues affecting triple-siting: logistics; personnel; infrastructure (including aircraft maintenance); and operational interaction (i.e., synergy) between the squadrons comprising the wing. These issues are discussed below.

2.6.4.1 Logistics

Two standardized Navy supply models were used in deriving additional costs for triple-site alternatives. The Readiness Based Sparing (RBS) model assumed full AIMD support and projected the additional Shore Activity Aviation Consolidated Allowance List (SHORCAL) of spare parts needed to outfit the three sites for the triple-site alternatives. In addition, the Repairables Integrated Model for Aircraft (RIMAIR) considers the turn-around times for locations without full AIMD support. This model also projects increases in on-hand spare parts necessary to cover contingencies arising from interruption of the repair and return process.

Using these two models and the single-site alternative at NAS Oceana (ARS 1) as a baseline (where total costs would equal zero), COMNAVAIRLANT projected the total annual and one-time logistic support costs, independent of separate AIMD costs. For triple-site alternatives, the sum of these costs would range from $15.9 to 21.1 million higher than those associated with a single-site alternative.

2.6.4.2 Personnel

As a result of the reduction in authorized personnel strengths and funding, personnel issues have become the subject of intense scrutiny as the Navy strives to maintain an acceptable quality of life while still reducing costs.

Triple-siting would adversely affect each of these concerns by requiring individuals to move between multiple geographic areas; limiting the number of job opportunities available for a particular Navy Enlisted Classification (NEC) or specialty; and eliminating an economy of scale currently realized through single-siting. Additionally, siting aircraft in multiple locations would entail duplication in personnel.

2.6.4.3 Infrastructure

Training infrastructure, particularly flight simulator facilities, are important elements of any aircraft basing. Simulators are used to minimize training costs through substitution for actual flight hours; practice delivery profiles for weapons and tactics for which real-life practice is too costly; practice emergency procedures without putting pilot and aircraft at risk; and enhance safety. They are crucial to both cost-effective and combat-ready operations. Their most efficient use is at a single site, collocated with all the fleet squadrons and the FRS. Multiple-siting requires additional simulators to meet mandated training requirements. The cost of the simulators alone, exclusive of the buildings housing them, is significant. Weapons training simulators cost approximately $50.5 million, and operational flight trainers cost approximately $6.9 million.

Similarly, maintenance support is a significant consideration because it is both critical and expensive. The AIMD is the most crucial component for on-site support. The Navy aviation procurement office (NAVAIR) develops plans for the weapons system, logistics support, and platform maintenance to establish the necessary maintenance and logistics support requirements for F/A-18 aircraft facilities. NAVAIR developed its plans for Atlantic Fleet F/A-18 aircraft on the premise that they would be single-sited (as at NAS Cecil Field) and thus would need only one local repair depot. The F/A-18 AIMD handles much of the necessary repair and maintenance, with only certain items handled at centralized major repair depots. This determines the procurement of parts and equipment and greatly reduces turn-around times through immediate issue of a replacement part and through elimination of handling and shipping times.

Engine use is a critical indicator of the need for an AIMD. According to Naval Air Force Atlantic data, three squadrons (i.e., one carrier air wing) would change out 52 engines a year. Also according to COMNAVAIRLANT data, the FRS changed 88 engines in 1996. The Navy's program maintenance standard for a complete engine repair capability, which an AIMD provides, is more than 50 changes a year. Thus, moving more than two squadrons or the FRS without an AIMD would result in inadequate maintenance by Navy standards. Adequate maintenance would require two or three AIMDs for each triple-site alternative, depending on the particular split of the squadrons.

Costs to establish an AIMD are significant. Again using the single-site alternative at NAS Oceana as a baseline (costs equal to zero), triple-site alternatives would require additional expenditures of $101.4 to 223.4 million just for support equipment. An additional 100 to 230 personnel would be needed to provide adequate AIMD support for triple-site alternatives.

Most importantly, the parts and testing equipment in an AIMD are limited in quantity and cannot be reproduced cheaply or quickly. The Navy inventory does not have the necessary quantity of parts and equipment to fully support the strike/fighter wing if it is divided among three sites.

2.6.4.4 Synergy

COMNAVAIRLANT emphasizes the synergy that would be lost by triple-siting the wing. This is an intangible that cannot be quantified, although synergy often translates into accomplishing training requirements at no cost. Nevertheless, in an aircraft community, which relies on shared experience and tight camaraderie, the loss in synergy incurred by triple-siting the wing would result in reductions in combat readiness.

2.6.5 Separating the F/A-18 FRS From Fleet Squadrons

As stated in Section 2.1, splitting the F/A-18 FRS from a majority of the fleet squadrons is considered unacceptable because of specific training, logistical, and maintenance interrelationships between the FRS and fleet squadrons. Within the past 30 years, the FRS has never been separated from the operational squadrons of the same type/model/series aircraft, except for training deployments. Separating the FRS from the fleet squadrons would detract significantly from the ability of the FRS and fleet squadrons to support each other, which has proven of great value. Experience shows that the FRS should be collocated with the majority of F/A-18 fleet squadrons and that separating the FRS from the fleet squadrons does not provide for responsible management of scarce fiscal resources. Maintenance parts, equipment, and personnel do not currently exist in the Navy's inventory to fully support such a separation.

For example, the practice of loaning aircraft or parts to provide the needed capability for deploying squadrons would be rendered very costly and difficult. At present, the FRS and fleet squadrons loan aircraft on an as-needed basis. During 1996, the FRS provided 25 loaned aircraft to the fleet squadrons, and the fleet squadrons provided 50 loaned aircraft to the FRS. These loans have been found to be more efficient both in time and maintenance than cannibalization for parts. Failure to collocate the FRS with fleet squadrons would result in added costs, both in fuel and in wear on the airframe, in ferrying the aircraft to where it was needed. Further, the pilots ferrying the aircraft would incur transportation costs back to their units for inactivity for the duration of the loan. Estimates of fuel and transportation costs attributable to loaning aircraft for separating the FRS from a majority of the fleet squadrons are approximately $650,000 per year for fuel and $80,000.00 per year for commercial

transportation. The real cost, however, is in readiness. Discontinuing the practice of loaning aircraft would result in aircraft shortages which in turn would prevent one FRS class per year (between 8 and 10 pilots) from completing its training. Without these replacement pilots, rotation dates would either have to be extended or the fleet squadrons would be undermanned on deployment. For fleet squadrons, another possible consequence is the inability to obtain training achievable only with FRS-unique assets (e.g., two-seat aircraft) and preclusion of achievement of established readiness goals and warfighting capabilities.

Training on specialized aircraft, such as the two-seat aircraft equipment assigned to the FRS, and necessary training on night vision equipment would likewise be significantly impacted. A small number of pilots in each fleet squadron are required to undergo night vision goggle training, so that there is some expertise with each fleet squadron. In order to realize economies in the instructors and two-seat aircraft necessary for this training, the training is conducted at the FRS rather than with each squadron. Approximately 20 pilots per year undergo this training, and each student pilot requires three flights. If the FRS is separated from all of the fleet squadrons, student pilots would have to take time from their other duties to travel on orders to the FRS for the training. Another, more likely, consequence for fleet squadrons is the inability to obtain this training. Squadrons would therefore deploy at less than their full warfighting capability.

In addition to the operational impacts on training and readiness, the cost of establishing and maintaining a separate FRS would be significant. The discussion in Section 2.6.4 concerning infrastructure and personnel impacts is also applicable to siting the FRS separately. The major concerns from a cost perspective are the need for a full AIMD and flight simulator and the necessity of funding two permanent change-of-station moves per pilot per year instead of one.

The FRS is the bedrock of aviation warfare training and the professional center of excellence for both air crew and enlisted maintenance personnel in each aviation warfare community. The FRS is the schoolhouse for each type of aircraft, where professional standardization and a sense of community belonging begins on day one. The operational presence of the fleet eliminates a training command mind set and gives real meaning to "fleet replacement" and the training continuum on which FRS students have embarked. Collocation of the FRS with a majority of the fleet squadrons provides immediate and daily access to the full resources of an aircraft community: senior leadership guidance and policies, tactical development, weapons schools, and overall fleet experience. New aviators leave the FRS and go to the fleet squadrons with a core knowledge of local airfield course rules, weapon ranges,

and target procedures, which provides an increased margin of safety as the replacement fleet aviators refine newly learned warfare skills.

The FRS is the centerpiece of the fleet trained cadre of aircrew and maintenance personnel. Experience has shown that there are significant benefits, both tangible and intangible, of collocating the FRS with fleet squadrons. Accordingly, the degraded capabilities resulting from separating the FRS from the bulk of the operational squadrons are thus considered unacceptable.

2.6.6 Moving Assets to Create Capacity for Atlantic Fleet F/A-18 Aircraft

Consideration was not given to creation of capacity by the relocation of assets not directed by the 1995 BRAC recommendation. The 1995 BRAC Commission specifically directed the Navy only to identify receiving sites for NAS Cecil Field F/A-18 aircraft. Therefore, creation of capacity through relocation of other assets is considered inconsistent with the intent of BRAC and was not considered further.

3 Affected Environment

This section describes the existing environment at and around NAS Oceana, MCAS Beaufort, and MCAS Cherry Point and the associated training ranges at each installation that could be affected through implementation of one of the five ARSs. The descriptions are based upon site visits conducted during 1995, 1996, and 1997; discussions with station personnel at each of the installations; discussions with federal, state, and local government agencies with potential jurisdiction or interests in components of the proposed action; and a review of past studies and reports relevant to the project.

The region of influence varies among the descriptions of the individual components of the existing environment (e.g., airfield and airspace operations, land use, socioeconomics, infrastructure, noise, terrestrial environment, etc.). Although all of these descriptions include on-station resources at each of the installations, discussions of off-station resources focus on areas most likely to be affected by each of the ARSs. For example, descriptions of off-station resources pertaining to socioeconomic and infrastructure resources at NAS Oceana focus on the cities of Virginia Beach and Chesapeake, Virginia, which, based upon the current residential location of personnel working or stationed at NAS Oceana, would be most likely to experience population effects from implementation of one of the ARSs. For similar reasons, off-station socioeconomic/infrastructure information associated with MCAS Beaufort focuses on Beaufort County, South Carolina, and Craven and Carteret counties, North Carolina, for resources at MCAS Cherry Point.

3.1 Affected Environment at NAS Oceana

3.1.1 Airfield Operations

As shown in Figure 3.1-1, NAS Oceana has two sets of dual runways for arrival and departure of air traffic. Runway 5/23 left/right (L/R) is the calm-wind runway (i.e., the preferred runway when winds are calm). Support facilities for F-14, adversary, and transient aircraft such as hangar space, fuel pits, and aircraft parking areas are located adjacent to Runway 5R. All A-6 aircraft facilities are located adjacent to Runway 32L. These facilities have progressively come off line as A-6 aircraft were decommissioned (ATAC 1997).

NALF Fentress is NAS Oceana's OLF. Airfield facilities at NALF Fentress include one runway (5/23) equipped with arresting gear for emergency landings. NALF Fentress is also used by aircraft stationed at NAS Norfolk, primarily by E-2 and C-2 aircraft.

Approach, departure, and interfacility flight tracks between NAS Oceana and NALF Fentress associated with Runway 5 L/R are depicted in Figure 3.1-2. Major flight tracks include:

- The Soucek/Norfolk Departure, taking aircraft northeast from the station;
- The Apollo Departure, taking aircraft south from the station;
- The Sanders Approach, bringing aircraft into the station from the south; and
- The ground controlled approach (GCA) box pattern (ATAC 1997).

Table 3.1-1 presents 1997 basic airfield operations (e.g., departures, arrivals, touch-and-go operations, FCLPs, etc.). These operations were calculated using the Naval Aviation Simulation Model (NASMOD). NASMOD is a state-of-the-art model developed by the Navy to analyze complex airfield, range, and airspace issues. NASMOD incorporates training requirements (syllabi); mission profiles; airfield, airspace, and air traffic control procedures; carrier and airwing deployment cycles; and ground operations. In addition, NASMOD includes weather impacts, sunrise/sunset times, and other factors that influence naval aviation training. NASMOD provides an array of operational data that capture the daily operational fluctuations at an installation. The current carrier turn-around cycle is 24 months: five months limited operations/unit level training, 12 months workup, six months overseas deployment, and one month stand down. The results of the simulation are dependent upon the airwing deployment cycle and where each airwing is in their workup cycle. During workup prior to deployment, squadrons will conduct local sorties at their home airfield and nearby

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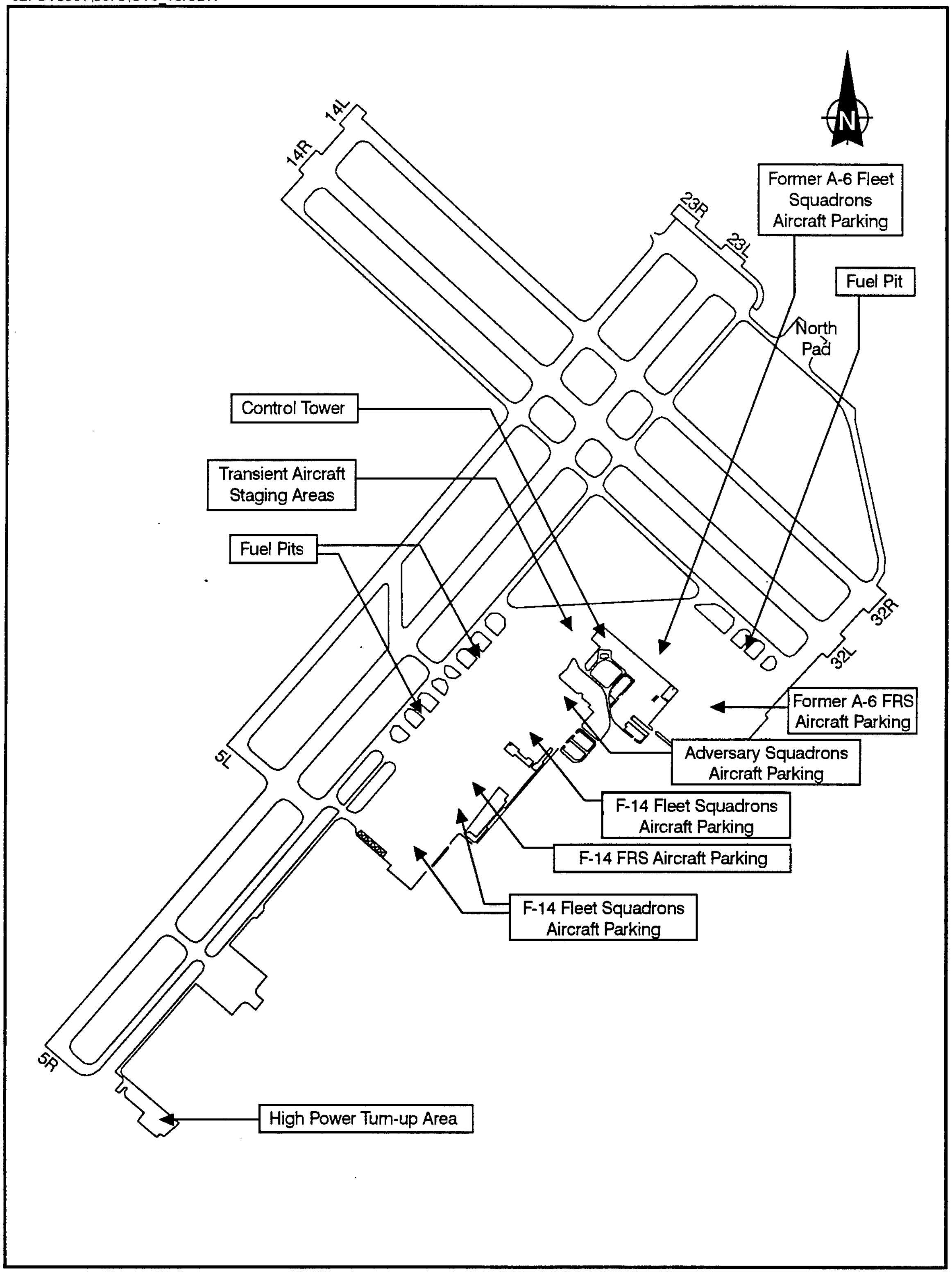

SOURCE: ATAC 1997

SCALE

0 1040 2,080 Feet

0 317 634 Meters

Figure 3.1-1 NAS OCEANA AIRFIELD LAYOUT

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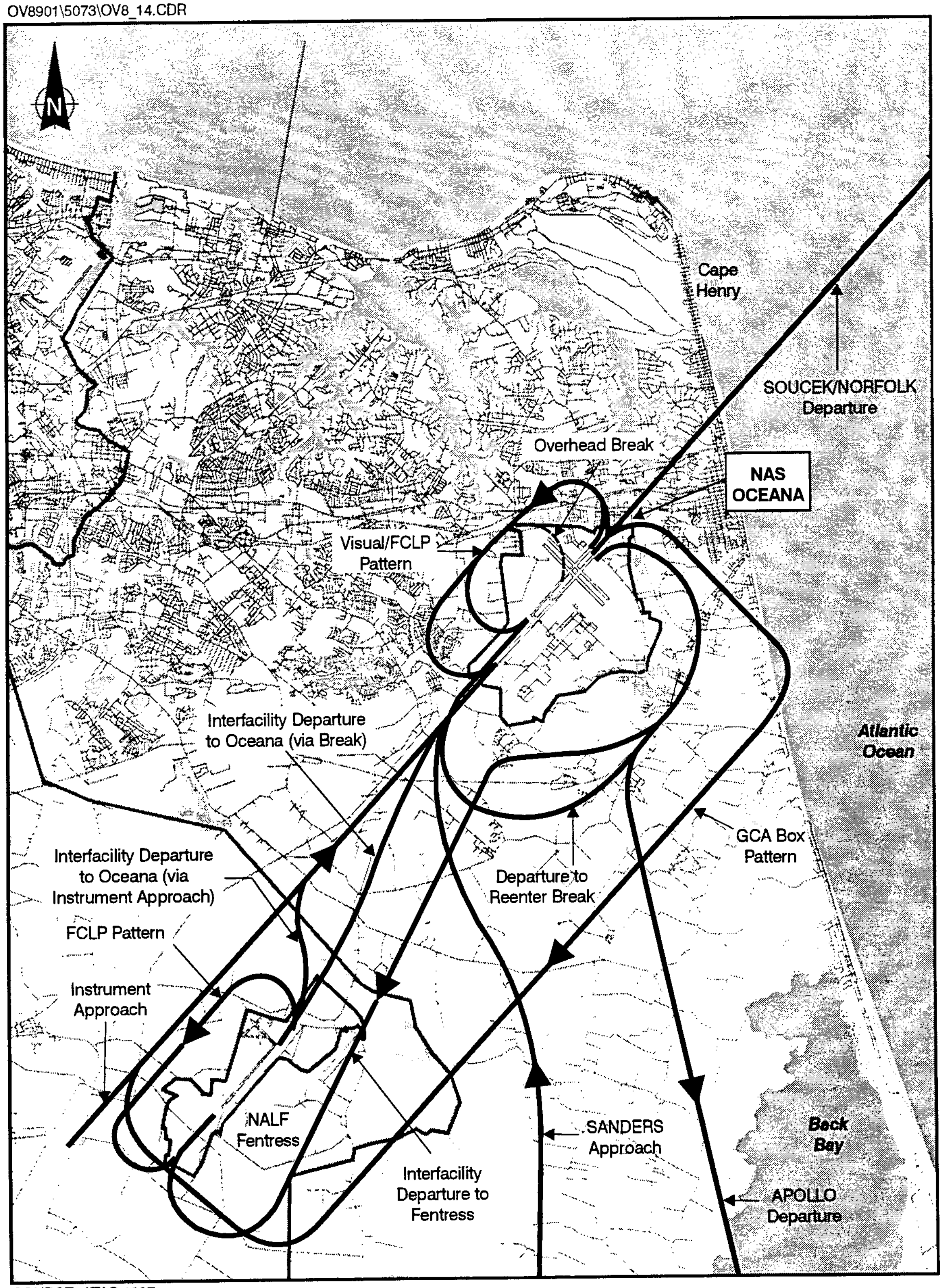

SOURCE: ATAC 1997

APPROXIMATE SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 3.1-2 NAS OCEANA FLIGHT TRACKS ASSOCIATED WITH RUNWAY 5

Table 3.1-1

1997 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS

Aircraft Category	Operation Type	Airfield Operations: Day 0700-2200	Airfield Operations: Night 2200-0700	Airfield Operations: Total
NAS Oceana				
F-14 Fleet	Departure	12,358	867	13,225
	Full Stop Visual Landing	11,360	1,340	12,700
	Full Stop Instrument Landing	399	115	514
	Visual Touch-and-Go/Low Approach	19,320	1,076	20,396
	Instrument Touch-and-Go/Low Approach	526	44	570
	Field Carrier Landing Practice	0	0	0
	TOTAL	**43,963**	**3,442**	**47,405**
F-14 FRS	Departure	6,627	320	6,947
	Full Stop Visual Landing	5,953	355	6,308
	Full Stop Instrument Landing	309	330	639
	Visual Touch-and-Go/Low Approach	26,502	954	27,456
	Instrument Touch-and-Go/Low Approach	3,774	1,460	5,234
	Field Carrier Landing Practice	0	0	0
	TOTAL	**43,165**	**3,419**	**46,584**
Adversary	Departure	826	13	839
	Full Stop Visual Landing	826	2	828
	Full Stop Instrument Landing	5	0	5
	Visual Touch-and-Go/Low Approach	436	0	436
	Instrument Touch-and-Go/Low Approach	168	0	168
	TOTAL	**2,261**	**15**	**2,276**

Table 3.1-1

1997 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS

Aircraft Category	Operation Type	Airfield Operations		
		Day 0700-2200	Night 2200-0700	Total
Transient Jet	Departure	947	20	967
	Full Stop Visual Landing	710	14	724
	Full Stop Instrument Landing	241	2	243
	Visual Touch-and-Go/Low Approach	1,050	28	1,078
	Instrument Touch-and-Go/Low Approach	806	30	836
	TOTAL	**3,754**	**94**	**3,848**
Transient Prop	Departure	1,611	31	1,642
	Full Stop Visual Landing	1,155	16	1,171
	Full Stop Instrument Landing	463	8	471
	Visual Touch-and-Go/Low Approach	2,838	52	2,890
	Instrument Touch-and-Go/Low Approach	2,568	42	2,610
	TOTAL	**8,635**	**149**	**8,784**
	AIRFIELD TOTAL	**101,778**	**7,119**	**108,897**
NALF Fentress				
F-14 Fleet	Field Carrier Landing Practice	28,000	10,640	38,640
F-14 FRS	Field Carrier Landing Practice	17,520	5,760	23,280
E-2 Fleet	Departure	112	56	168
	Full Stop Visual Landing	112	56	168
	Field Carrier Landing Practice	10,976	5,488	16,464
E-2 FRS	Departure	476	140	616
	Full Stop Visual Landing	476	140	616
	Field Carrier Landing Practice	12,648	3,720	16,368

Table 3.1-1

1997 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS

Aircraft Category	Operation Type	Airfield Operations: Day 0700-2200	Airfield Operations: Night 2200-0700	Airfield Operations: Total
C-2 Fleet	Departure	106	6	112
	Full Stop Visual Landing	106	6	112
	Field Carrier Landing Practice	7,828	296	8,124
	AIRFIELD TOTAL	**78,360**	**26,308**	**104,668**

Source: ATAC 1997.

training areas as well as temporary detachments to other airfields or at-sea exercises with the carrier. Appendix C provides the assumed airwing deployments. The simulation results provide data for a one-year period during the workup cycle. A one-year simulation period provides results that account for seasonal variations, weather, and the impacts of airwing and squadron deployment schedules. Slight shifts in the deployment schedules will have an impact on the number of sorties or operations generated at any installation. However, as discussed in Section 3.1.8, small changes in the annual level of operations will not have significant effects on the resulting noise exposure. For example, a 10% increase or decrease in operations will increase or decrease the noise contour by less than 0.5 dB. Hence, the results of the NASMOD simulations provide an excellent picture of projected operations based on assumed aircraft loading and various training requirements (ATAC 1997). NASMOD was also used to present current airfield operations to account for operations of F-14 aircraft transferred to the station in 1996 and 1997 (see Section 3.1.5).

3.1.2 Military Training Areas

Airspace used by aircraft stationed at NAS Oceana extends from the Chesapeake Bay south along the Atlantic coast to Pamlico Sound in North Carolina (ATAC 1997). The airspace extends over both land and water areas and includes military training routes (MTRs) and defense-related special use airspace such as warning areas, restricted areas, and military operating areas (MOAs), which are all designed to support the various missions at the station. These areas are shared with aircraft from other DoD installations (Navy, Marine Corps, Air Force, Army, National Guard, etc.).

The military training areas are designated by the Federal Aviation Administration (FAA) at the request of the user(s). Flight operations in these areas are conducted over a range of altitudes, depending on the type of aircraft, available capacity, and training mission. Special use airspace in the vicinity of NAS Oceana and MCAS Cherry Point is shown on Figure 3.1-3. Definitions of MTRs and various categories of special use airspace are as follows:

- MTR - airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots indicated air speed (IAS).
  - Instrument Flight Rule (IFR) MTRs - routes used by DoD and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training in both IFR and visual flight rule (VFR) weather conditions below 10,000 feet (305 meters) mean sea level (MSL) at airspeeds in excess of 250 knots IAS.

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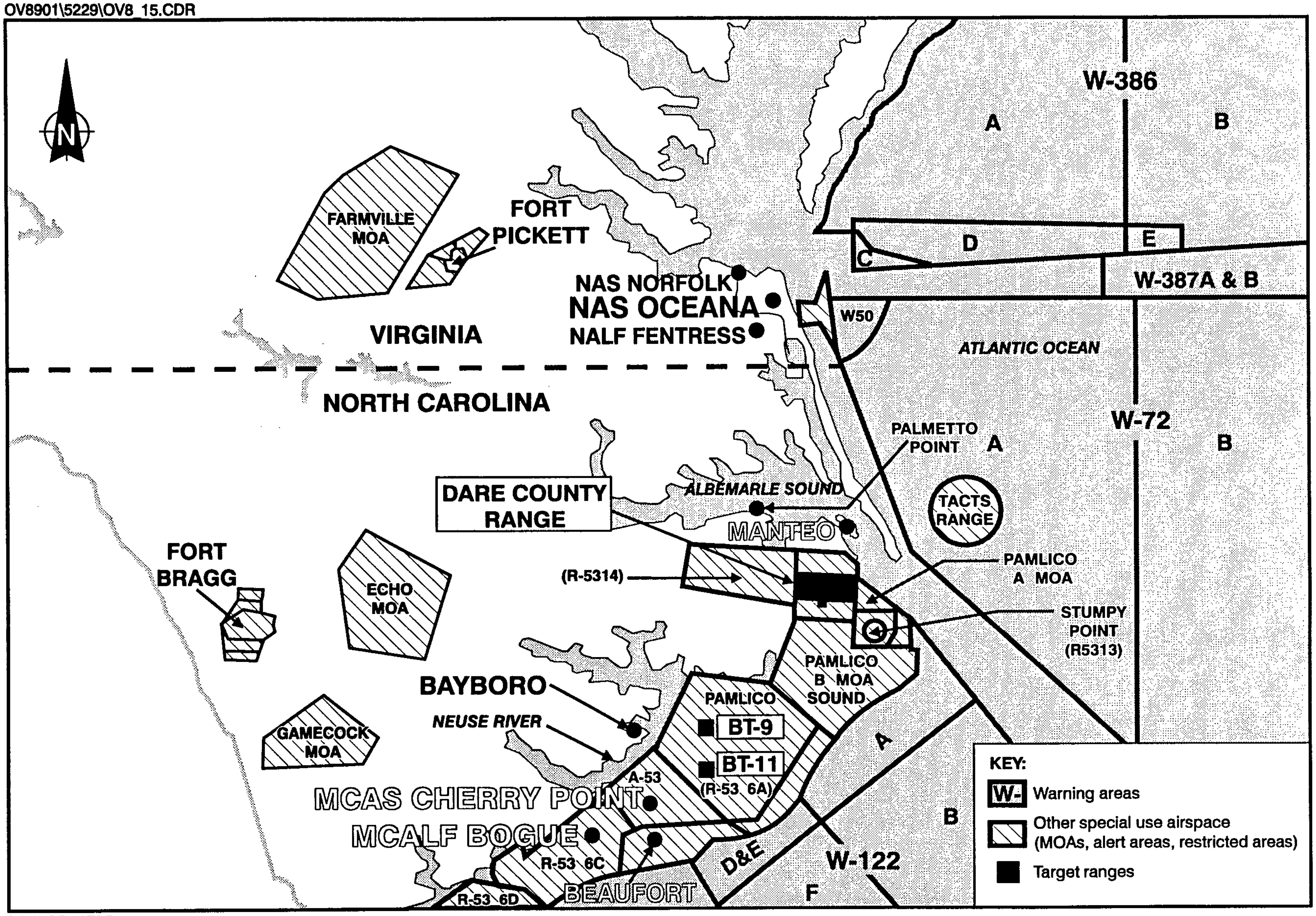

SOURCE: ATAC 1997

SCALE
0 22 44 Miles
0 35.5 71 Kilometers

Figure 3.1-3 SPECIAL USE AIRSPACE - NAS OCEANA AND MCAS CHERRY POINT

- VFR MTRs - routes used by DoD and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR below 10,000 (305 meters) feet MSL at airspeeds in excess of 250 knots IAS.

- Warning Area ("W" area) - airspace of defined dimensions extending from 3 NM outward from the coast of the United States that contains activity that may be hazardous to nonparticipating aircraft. The purpose of such areas is to warn nonparticipating pilots of the potential danger. A warning area may be located over domestic or international waters or both.

- MOA - airspace established outside of Class A airspace areas to separate or segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. Class A airspace is that airspace from 18,000 feet (549 meters) MSL (Flight Level [FL] 180) up to and including 60,000 feet (1,829 meters) (FL 600), including the airspace overlying the waters within 12 NM of the coast of the 48 contiguous United States and Alaska. Unless otherwise authorized, all persons must operate their aircraft under IFR.

- Restricted Area ("R" area) - airspace designated under Federal Aviation Regulations Part 73 within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use, and IFR/VFR operations in the area may be authorized by the controlling air traffic control facility when it is not being utilized by the using agency. Restricted areas are depicted on en route charts. Where joint use is authorized, the name of the air traffic control controlling facility is also indicated.

- Controlled Firing Area (e.g., Target Range) - airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.

- Prohibited Area - airspace designated under Federal Aviation Regulations Part 73 within which no person may operate an aircraft without the permission of the using agency.

- Alert Area ("A" Area) - airspace that may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which are hazardous to nonparticipating aircraft. Alert Areas are depicted on aeronautical charts for the information of nonparticipating pilots. All activities within an Alert Area are conducted in accordance with Federal Aviation Regulations. Pilots of participating aircraft as well as pilots transiting the area are equally responsible for collision avoidance.

Military training areas include designated and authorized air and surface water areas located within the public domain.

3.1.2.1 Military Training Routes

MTRs, which are designated and charted by the FAA, are used for visual (i.e., V Route [VR]) and instrument (i.e., I Route [IR]) training flights. These routes are administered by a variety of agencies. The originating agency for an MTR is responsible for scheduling the route and periodically verifying that the route avoids hazards (e.g., new transmitting towers) and populated areas (ATAC 1997). MTRs to be used by aircraft that would be realigned to NAS Oceana include VR-0073, VR-0085, VR-1043, VR-1040, VR-1074, VR-1046, VR-1752, VR-1753, VR-1754, VR-1758, VR-1759, and IR-714. These routes are confined to areas over Virginia, North Carolina, and West Virginia. Figure 3.1-4 shows the primarily affected MTRs.

Table 3.1-2 presents existing (1997) operations and maximum sound levels along each of the MTRs (ATAC 1997; Wyle Labs 1997). Operations are listed by the number of sorties conducted along each MTR by aircraft type. Using typical flight profiles, engine thrust settings, and airspeeds for each type of aircraft, the Navy calculated existing sound levels using the MR_NMAP computer modeling program (Wyle Labs 1997).

Sound levels along MTRs generate a noise environment that is somewhat different from that associated with airfield operations (see Section 3.1.8). As opposed to patterned or continuous noise environments associated with airfields, overflights along MTRs are highly sporadic (Wyle Labs 1997). To represent these differences, accepted noise metrics are adjusted to account for the "surprise" effect of the sudden onset of the aircraft noise. This metric is designated as the onset-rate adjusted day-night average sound level (Ldnmr), expressed in decibels (dB). For aircraft noise events exhibiting a rate of increase in sound level of 15 to 30 dB per second, a penalty of 0 to 5 dB is added to normal sound exposure levels (Wyle Labs 1997).

The Ldnmr measurements presented in Table 3.1-2 for each of the affected MTRs represent the maximum level under one or more segments along each route, taken at the center line of the route. A full discussion of MR_NMAP and Ldnmr calculations is provided in Section 3.1.8. For the primarily affected MTRs, existing maximum Ldnmr values range from less than 50 to 57 dB.

3.1.2.2 Warning Areas

A number of off-shore warning areas would be used by the aircraft to be realigned to the station (see Figure 3.1-3). Aircraft operations conducted in warning areas primarily involve air-to-air combat training and are rarely conducted below 5,000 feet (1,515 meters). Noise exposure at surface level is mostly associated with low level operations such as along

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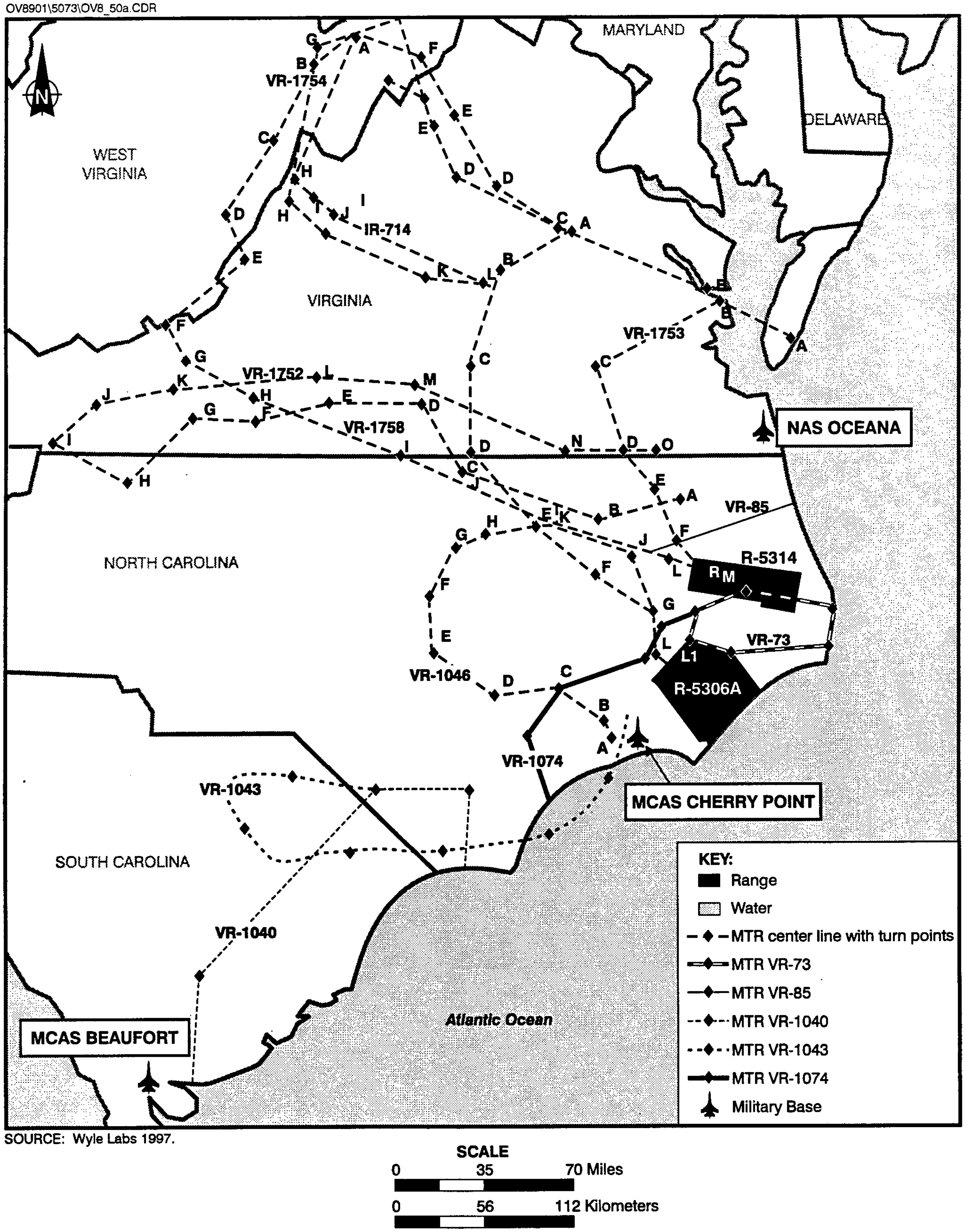

SOURCE: Wyle Labs 1997.

Figure 3.1-4 MILITARY TRAINING ROUTES IN VICINITY OF NAS OCEANA AND MCAS CHERRY POINT

Table 3.1-2

1997 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS

MTR	Aircraft Type	1997 Sorties Day	1997 Sorties Night	1997 Sorties Total	Maximum Ldnmr[a] (dB)
VR-0073	A-6	5	0	5	52
	AV-8B	194	5	199	
	EA-6B	38	1	39	
	F-14	61	0	61	
	F-15	589	12	601	
	F-16	72	0	72	
	F/A-18	6	0	6	
	T-38	4	0	4	
	Total	**969**	**18**	**987**	
VR-0085	AV-8B	0	0	0	<50
	F-14	50	0	50	
	F-15	464	0	464	
	F-16	19	0	19	
	F/A-18	11	0	11	
	EA-6B	0	0	0	
	KC-130	0	0	0	
	Total	**544**	**0**	**544**	
VR-1040	A-10	9	0	9	52
	AV-8B	101	0	101	
	KC-130	28	0	28	
	EA-6B	78	0	78	
	F-14	0	0	0	
	F-16	520	0	520	
	F/A-18	18	0	18	
	Total	**754**	**0**	**754**	
VR-1043	A-6	405	0	405	55
	AV-8B	64	0	64	

Key at end of table.

Table 3.1-2

1997 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS

MTR	Aircraft Type	1997 Sorties Day	Night	Total	Maximum Ldnmr[a] (dB)
	KC-130	32	0	32	
	EA-6B	74	0	74	
	F-15	28		28	
	F-16	115	0	115	
	F/A-18	37	0	37	
	Total	755	0	755	
VR-1046	A-10	9	0	9	57
	A-6	299	64	363	
	AV-8	78	0	78	
	EA-6B	21	16	37	
	F-15	41	0	41	
	F-16	9	0	9	
	F/A-18	92	0	92	
	F-4	9	0	9	
	T-2	4	0	4	
	Total	**562**	**80**	**642**	
VR-1752	A-4	5	0	5	50
	A-6	176	3	179	
	AV-8B	5	1	6	
	C-17	1	0	1	
	KC-130	10	0	10	
	EA-6B	162	5	167	
	F-111	5	0	5	
	F-14	17	2	19	
	F-15	183	8	191	
	F-16	3	0	3	
	F/A-18	23	0	23	

Key at end of table.

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Table 3.1-2

1997 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS

MTR	Aircraft Type	1997 Sorties Day	1997 Sorties Night	1997 Sorties Total	Maximum Ldnmr[a] (dB)
	TA-4	3	0	3	
	Total	**593**	**19**	**612**	
VR-1753	A-6	399	19	418	51
	AV-8B	32	2	34	
	C-2	7	0	7	
	EA-6B	25	2	27	
	F-14	277	3	280	
	F-15	142	2	144	
	F-16	170	4	174	
	F/A-18	8	0	8	
	S-3	2	0	2	
	Total	**1,062**	**32**	**1,094**	
VR-1754	A-6	129	5	134	<50
	CH-53	7	0	7	
	EA-6B	68	1	69	
	F-14	31	0	31	
	F-15	75	6	81	
	F-16	3	0	3	
	F/A-18	123	2	125	
	AV-8B	0		0	
	KC-130	0	0	0	
	Total	**436**	**14**	**450**	
VR-1758	A-4	10	0	10	56
	A-6	441	7	448	
	AV-8B	21	1	22	
	B-1	7	0	7	
	B-52	1	0	1	

Key at end of table.

Table 3.1-2

1997 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS

MTR	Aircraft Type	1997 Sorties			Maximum Ldnmr[a] (dB)
		Day	Night	Total	
	EA-6B	137	2	139	
	F-14	119	6	125	
	F-15	184	4	188	
	F-16	8	0	8	
	F/A-18	13	1	14	
	KC-130	0	0	0	
	Total	**941**	**21**	**962**	
VR-1759	A-6	111	3	114	<50
	AV-8B	15	2	17	
	EA-6B	11	0	11	
	F-14	26	1	27	
	F-15	9	0	9	
	F/A-18	3	0	3	
	KC-130	0	0	0	
	Total	**175**	**6**	**181**	
VR-1074	A-6	17	0	17	52
	AV-8B	187	9	196	
	EA-6B	34	0	34	
	F-14	8	0	8	
	F-15	403	0	403	
	F-16	12	0	12	
	F/A-18	16	0	16	
	Total	**677**	**9**	**686**	
IR-0714	A-6	9	65	74	<50
	EA-6B	17	82	99	
	F/A-18	0	0	0	
	Total	26	147	173	

Key at end of table.

Table 3.1-2 (Cont.)

[a] Maximum Ldnmr expressed in decibels under one or more segments along the MTR.

Key:

dB = Decibels.
IR = Instrument route.
Ldnmr = Onset-rate adjusted day-night average sound level.
MTR = Military training route.
VR = Visual route.

Source: ATAC 1997; Wyle Labs 1997.

MTRs and in Restricted Areas and Target Ranges, where operations are conducted at altitudes as low as 500 feet (132 meters). Therefore, no sound level calculations are presented for warning areas. It should be noted that actions are being taken by the FAA and various airspace users to reorganize the subcompartmentalization of warning areas. This process is not yet complete; therefore, Figure 3.1-3 presents the current airspace structure. 1997 sorties for each of these warning areas are presented in Table 3.1-3. Descriptions of these areas are provided below.

TACTS Range

The Tactical Aircrew Combat Training System (TACTS) range is located in the southwestern portion of W-72A. Published weekday operating hours are 7:00 a.m. to 5:00 p.m. in the summer, and 7:00 a.m. to 6:00 p.m. in the winter. The range can be scheduled for overtime use during weekday off-hours and weekends. The range is scheduled in 30-minute blocks by the Navy Fighter Wing One, Atlantic (ATAC 1997). Due to limited airspace, only one event can be scheduled at a time. Several aircraft can participate in an event.

W-72

W-72 is located southeast of NAS Oceana and includes two subareas (A/B), excluding the area under the authority of the TACTS range. W-72 is administered by the Fleet Area Control Surveillance Facility/Virginia Capes (FACSFAC VACAPES), which coordinates the Virginia Capes, Atlantic City, Narragansett Bay, Patuxent River, and Cherry Point operating areas (LANTDIV 1985). Most use of W-72 occurs concurrently and there is no limit imposed on the number of simultaneous sorties. However, FACSFAC VACAPES advises on current levels of activity and can suggest possible blocks of unused airspace within the area. The airspace can also be scheduled for exclusive use for special events (e.g., missile shoots), during which the entire area, including the TACTS range, is reserved only for aircraft participating in the event (ATAC 1997).

W-386A/B

W-386 is divided into two subareas, A and B, located northeast of NAS Oceana. Missile launches from the National Aeronautics and Space Administration (NASA) Wallops Flight Facility have the highest priority for use of this airspace. Air Force and Air National Guard units have priority over the Navy for scheduling exclusive-use events in this airspace.

Table 3.1-3

1997 SORTIES IN WARNING AREAS IN THE VICINITY OF NAS OCEANA AND MCAS CHERRY POINT

User/Service Category	Day (0700 - 2200)	Night (2200 - 0700)	Total
TACTS Range			
F-14 (NAS Oceana Fleet)	2,869	47	2,916
F-14 (NAS Oceana FRS)	543	0	543
Adversary Aircraft	612	14	626
Air Force Jets	704	11	715
Total	**4,728**	**72**	**4,800**
W-72 (exclusive of TACTS Range)			
F-14 (NAS Oceana Fleet)	2,942	58	3,000
F-14 (NAS Oceana FRS)	2,739	0	2,739
F/A-18 (Marine Corps)	75	0	75
KC-130 (MCAS Cherry Point FRS)	4	0	4
Adversary Aircraft	121	0	121
Other Navy Aircraft	2,771	204	2,975
Air Force Jets	1,323	0	1,323
Other Air Force Aircraft	69	41	110
Coast Guard Aircraft	46	33	79
Contractor	876	0	876
Civilian	34	37	71
Total	**11,000**	**373**	**11,373**
W-386 A/B			
F-14 (NAS Oceana Fleet)	0	0	0
F-14 (NAS Oceana FRS)	14	0	14
F/A-18 (Marine Corps)	15	0	15
Other Navy Aircraft	360	199	559
Air Force Jet	3,308	0	3,308
Other Air Force Aircraft	75	24	99

Key at end of table.

Table 3.1-3

1997 SORTIES IN WARNING AREAS IN THE VICINITY OF NAS OCEANA AND MCAS CHERRY POINT

User/Service Category	Day (0700 - 2200)	Night (2200 - 0700)	Total
Coast Guard Aircraft	17	2	19
NASA (missile launches)	183	0	183
Contractor	7	4	11
Civilian	129	27	156
Total	**4,108**	**256**	**4,364**
W-386 D			
F-14 (NAS Oceana Fleet)	275	5	280
F-14 (NAS Oceana FRS)	684	0	684
Adversary Aircraft	0	0	0
Air Force Jets	3	0	3
NASA (missile launches)	183	0	183
Total	**1,145**	**5**	**1,150**
W-122			
F-14 (NAS Oceana Fleet)	718	44	762
F-14 (NAS Oceana FRS)	123	0	123
Adversary Aircraft	0	0	0
F/A-18 (Marine Corps)	551	68	619
AV-8 (Cherry Point Fleet)	2,130	32	2,162
AV-8 (MCAS Cherry Point FRS)	1,316	0	1,316
EA-6B (MCAS Cherry Point Fleet)	1,606	15	1,621
KC-130 (MCAS Cherry Point Fleet)	144	0	144
KC-130 (MCAS Cherry Point FRS)	231	0	231
Other Navy Aircraft	452	184	636
Air Force Jets	4,852	573	5,425
Other Air Force Aircraft	270	60	330

Key at end of table.

Table 3.1-3

1997 SORTIES IN WARNING AREAS IN THE VICINITY OF NAS OCEANA AND MCAS CHERRY POINT

User/Service Category	Day (0700 - 2200)	Night (2200 - 0700)	Total
Coast Guard Aircraft	40	4	44
Contractor	34	9	43
Civilian	774	63	837
Total	**13,241**	**1,052**	**14,293**

Key:

FRS = Fleet Replacement Squadron.
MCAS = Marine Corps Air Station.
NAS = Naval Air Station.
TACTS = Tactical Aircrew Combat Training System.
W = Warning area.

Source: ATAC 1997.

The area is administered by FACSFAC VACAPES and is scheduled by the Air Force Air Combat Command, First Fighter Wing.

W-386D

This subarea of W-386 is situated along the southeast edge of W-386A. While the Air Force has scheduling priority for this airspace, they do not use it because of its limited size (ATAC 1997). The Navy uses this area primarily for air-to-air gunnery training. It is administered by FACSFAC VACAPES.

W-122

This large warning area is located south of the Cape Hatteras coastline. Aircraft based at NAS Oceana use this area primarily for large strike missions into R-5306A and as a location for air combat maneuvers. It is administered by FACSFAC VACAPES (ATAC 1997).

3.1.2.3 Military Operating Areas

Although several MOAs exist within the region, use of these areas would be very limited because of the mission profiles of aircraft to be realigned from NAS Cecil Field. The only MOA in the vicinity of NAS Oceana affected by the proposed action would be the Stumpy Point MOA, which is located over Pamlico Sound (see Figure 3.1-3). Noise was not modeled at the Stumpy Point MOA because very few operations would be conducted below 3,000 feet AGL. As presented in Table 3.1-4, only 56 operations would be conducted in this MOA.

Table 3.1-4

1997 SORTIES IN THE STUMPY POINT MILITARY OPERATING AREA

User/Service Category	Day (0700-2200)	Night (2200-0700)	Total
F-14 (NAS Oceana Fleet)	50	6	56
F/A-18	0	0	0
Total	**50**	**6**	**56**

Key:

NAS = Naval Air Station.

Source: ATAC 1997.

3.1.2.4 Restricted Areas

The restricted areas primarily affected by implementation of each ARS would be R-5314, located south of Abermarle Sound; R-5306A, located over the Pamlico Sound near the mouths of the Pamlico and Neuse rivers; and R-5306D, located 25 miles (40 kilometers) south of MCAS Cherry Point. These areas support various high- and low-altitude training operations, contain various target ranges (see Section 3.1.3), and are available for use on a 24-hour basis.

R-5314 is scheduled by Seymour Johnson Air Force Base. It is used almost exclusively for target missions involving aircraft destined for the Dare County Range (see Section 3.1.3) (ATAC 1997).

R-5306A is scheduled by MCAS Cherry Point Central Scheduling. While many of the aircraft operations in this airspace involve flights destined for target ranges located within this airspace (i.e., BT-9 and BT-11), missions not involving these targets have increased over the last few years (ATAC 1997). This is because R-5306A contains the Mid-Atlantic Electronic Warfare Range (MAEWR), which consists of a complex of electronic threat emitters to simulate operations in a hostile electronic warfare environment (i.e., where hostile forces emits signals that hamper radar, navigation, communications, and guidance systems).

R-5306D is located within the Marine Corps Base (MCB) Camp Lejeune Complex and is scheduled by MCB Camp Lejeune Range Control. It is used by fixed-wing aircraft during close-air-support missions, forward base operations, and other missions involving troop support (ATAC 1997).

Table 3.1-5 presents 1997 operations in restricted areas that are exclusive of missions to target ranges. Because sorties in R-5314 largely involve missions to the Dare County Range, no operations data are presented. Existing operations in the Dare County Range (see Table 3.1-6) would constitute the operations in R-5314.

3.1.3 Target Ranges

To fulfill its training needs, the Navy uses various types of air-to-surface target ranges. A target range is a specific area that must be able to receive air-dropped ordnance. Target ranges are located under restricted areas with flight paths open to military aircraft (i.e., attack aircraft). These ranges vary in terms of the use of live versus inert ordnance and deployment of weapons against ground- versus water-level targets. Five separate target ranges would be used by aircraft to be realigned from NAS Cecil Field. These include bombing target (BT)-9 (Brant Island Shoal), BT-11 (Piney Island), Stumpy Point, Palmetto Point, and the Dare County Range (see Figures 3.1-5 and 3.1-6). However, very little

Table 3.1-5

1997 RESTRICTED AREA SORTIES AND NOISE LEVELS

Restricted Area	Aircraft Type	1997 Sorties			Ldnmr (dB)
		Day	Night	Total	
R-5306A (exclusive of BT-9 and BT-11)	A-10	30	0	30	<50
	AH-1	136	0	136	
	AV-8 (Fleet)	1,003	18	1,021	
	AV-8 (FRS)	1,553	0	1,553	
	EA-6B	279	9	288	
	F/A-18 (Marines)	91	0	91	
	F-15	56	0	56	
	F-16	208	4	212	
	F-16 (Air National Guard)	26	0	26	
	Other Jet	35	0	35	
	Other Prop	90	0	90	
	Total	**3,507**	**31**	**3,538**	
R-5306D	F/A-18	4,095	0	4,095	54
	AV-8B (Fleet)	560	2	562	
	KC-130 (Fleet)	22	0	22	
	KC-130 (FRS)	34	0	34	
	AH-1	160	5	165	
	UH-1	300	5	305	
	CH-46	3,255	105	3,360	
	CH-53	1,300	70	1,370	
	Total	**9,726**	**187**	**9,913**	

Source: ATAC 1997; Wyle Labs 1997.

Table 3.1-6

1997 TARGET RANGE ACTIVITY AND NOISE LEVELS

Range	Aircraft Type	1997 Sorties			Existing Ldnmr (dB)
		Day	Night	Total	
BT-9	A-10	110	0	110	60
	AH-1	78	0	78	
	AV-8B (Fleet)	246	6	252	
	AV-8B(FRS)	25	0	25	
	EA-6B	13	0	13	
	CH-46	75	0	75	
	CH-53	0	2	11	
	F-14 (NAS Oceana Fleet)	68	0	68	
	F-14 (Other Navy)	30	0	30	
	F-15	52	0	52	
	F-16	380	8	388	
	F/A-18 (Other Navy)	237	28	265	
	F/A-18 (Marine Corps)	190	10	200	
	H/UH-1	29	0	29	
	Army Helos[a]	74	8	82	
	Other Jet[b]	43	0	43	
	Other Prop[c]	20	0	20	
	Total BT-9	**1,670**	**62**	**1,732**	
BT-11	A-10	120	0	120	68
	EA-6B	13	0	13	
	AH-1	107	0	107	
	AV-8B (Fleet)	1,162	36	1,198	
	AV-8B (FRS)	720	0	720	
	KC-130 (MCAS Cherry Point Fleet)	18	0	18	
	CH-46	123	0	123	
	CH-53	13	2	15	

Key at end of table.

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Table 3.1-6

1997 TARGET RANGE ACTIVITY AND NOISE LEVELS

Range	Aircraft Type	1997 Sorties Day	1997 Sorties Night	1997 Sorties Total	Existing Ldnmr (dB)
	F-14 (NAS Oceana Fleet)	494	2	496	
	F-14 (Other Navy)	30	0	30	
	F-15	400	6	406	
	F-16	388	0	388	
	F-16 (Air National Guard)	198	0	198	
	F/A-18 (Other Navy)	237	28	265	
	F/A-18 (Marine Corps)	362	22	384	
	H/UH-1	43	0	43	
	Army Helos[a]	80	8	88	
	Other Jet[b]	14	3	17	
	Other Prop[c]	17	0	17	
	Total BT-11	**4,539**	**107**	**4,646**	
Dare County Range	A-10	14	0	14	65
	AV-8B (Fleet)	68	0	68	
	AV-8B (FRS)	10	0	10	
	EA-6B	5	0	5	
	F-14 (NAS Oceana Fleet)	2,986	38	3,024	
	F-14 (NAS Oceana FRS)	1,027	0	1,027	
	F-14 (Other Navy)	9	0	9	
	F-15	156	4	160	
	F-16	346	4	350	
	F-16 (Air National Guard)	498	26	524	
	F/A-18 (Adversary)	12	0	12	
	F/A-18 (Other Navy)	53	0	53	
	F/A-18 (Marine Corps)	26	6	32	

Key at end of table.

Table 3.1-6

1997 TARGET RANGE ACTIVITY AND NOISE LEVELS

Range	Aircraft Type	1997 Sorties			Existing Ldnmr (dB)
		Day	Night	Total	
	T-34[d]	0	0	0	
	Total Dare County Range	**5,210**	**78**	**5,288**	

Note: Day is defined as 0700-2200; night is defined as 2200-0700.

[a] Modeled as AH-64.
[b] Modeled as F/A-18.
[c] Modeled as C-130.
[d] Not modeled.

Key:

BT = Bombing target.

Source: ATAC 1997; Wyle Labs 1997.

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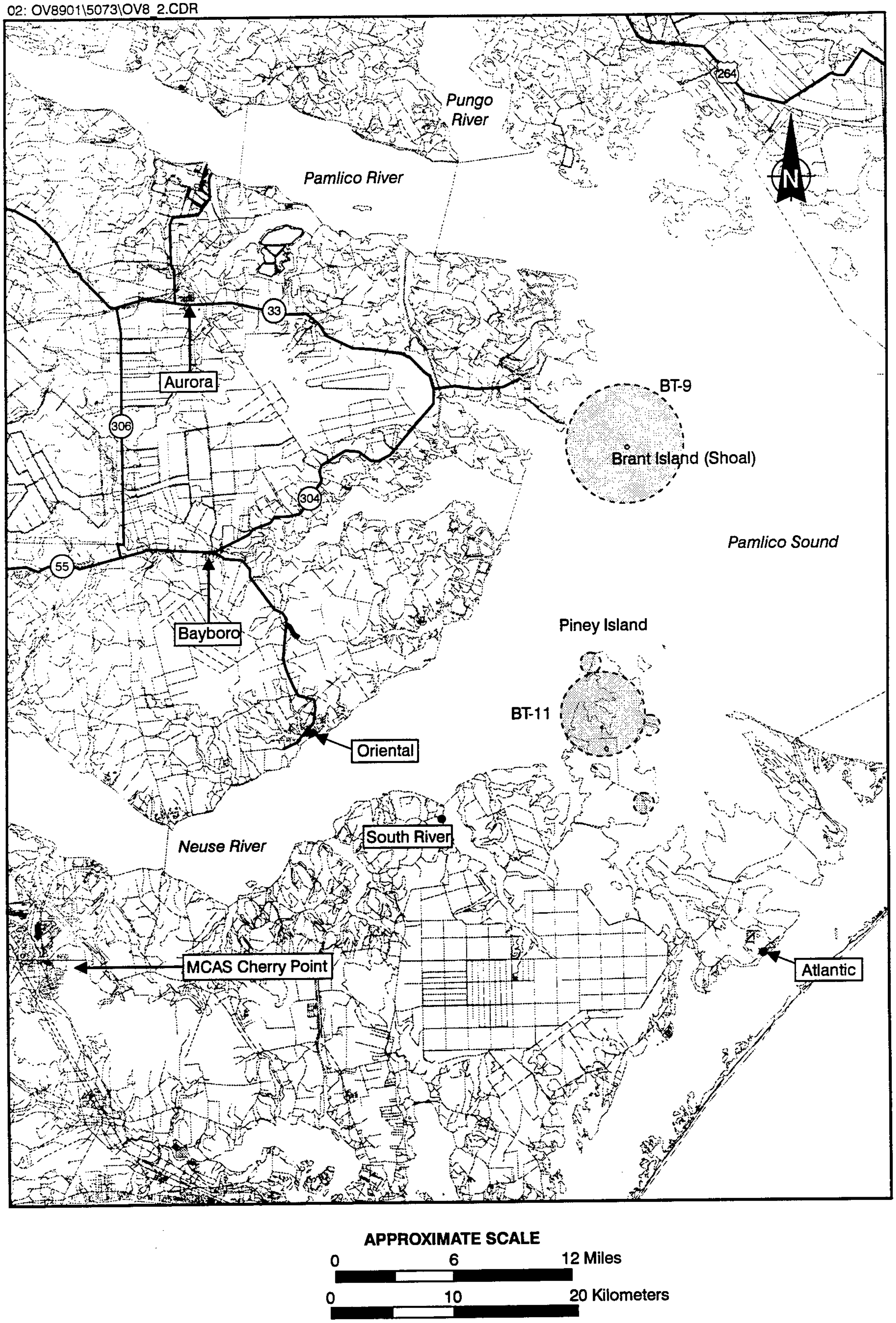

Figure 3.1-5 LOCATIONS OF BRANT ISLAND (BT-9) AND PINEY ISLAND (BT-11)

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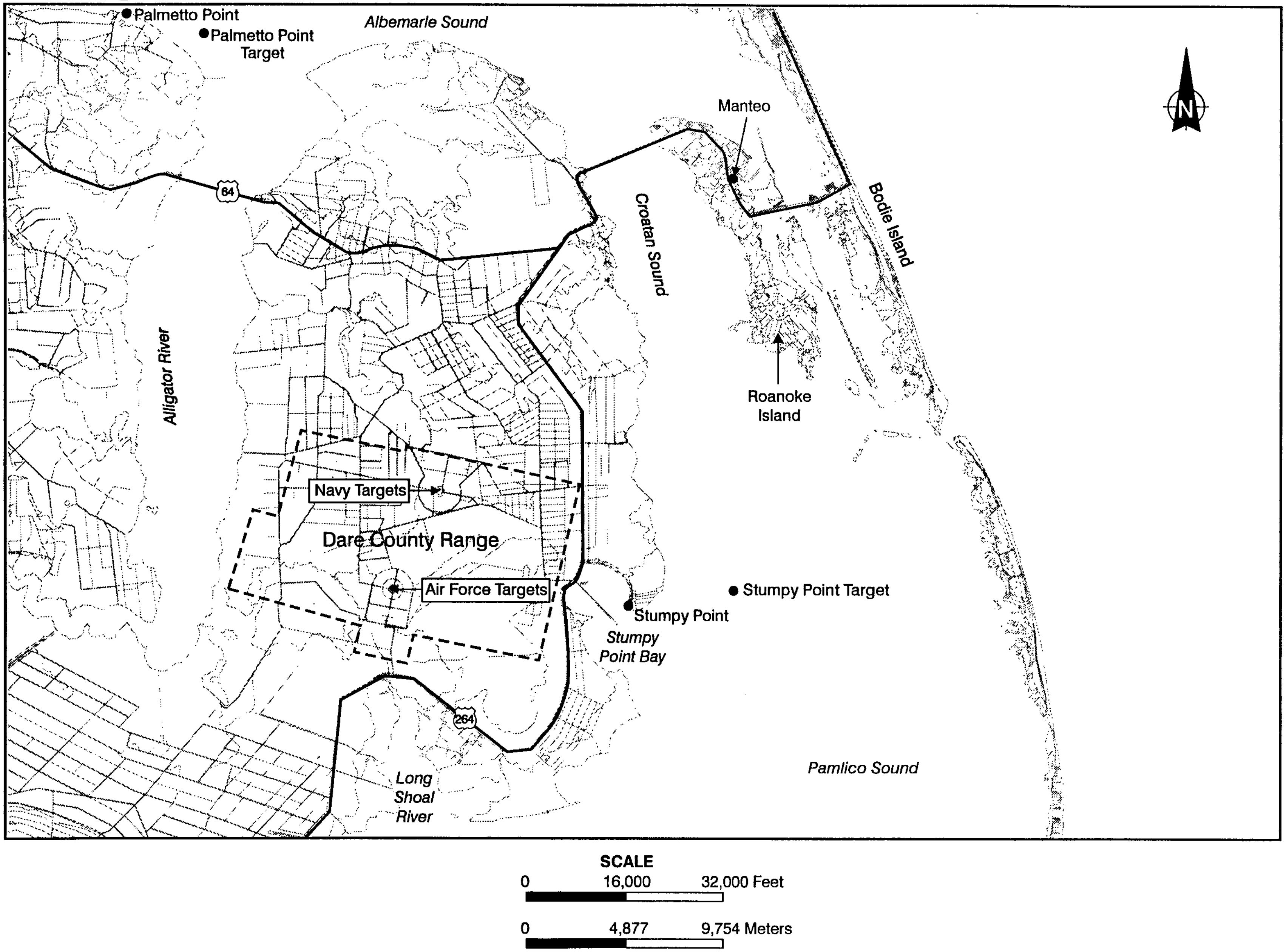


Figure 3.1-6 LOCATION OF DARE COUNTY RANGE

increase over historical use levels of the Stumpy Point and Palmetto Point targets is anticipated.

Table 3.1-6 presents current (1997) aircraft operations by aircraft type for the three primary ranges—BT-9, BT-11, and the Dare County Range. It should be noted that all operations at BT-9 and BT-11 are conducted in conjunction with operations at R-5306A. Operations at the Dare County Range are conducted in conjunction with operations at R-5314.

As with MTRs, the Navy has calculated Ldnmr levels for the three primary ranges using the MR_NMAP program with existing flight profiles, airspeeds, and engine thrust settings (ATAC 1997). However, unlike the calculations for MTRs, these existing Ldnmr levels represent the average noise exposure levels at any point within each respective range. Existing Ldnmr levels for BT-9, BT-11, and the Dare County Range are 60, 68, and 65 dB, respectively (Wyle Labs 1997).

Descriptions of the three primary target ranges and the environmental resources within them are presented below.

3.1.3.1 BT-9 (Brant Island Shoal)

BT-9 is located within R-5306A, approximately 150 miles (242 kilometers) south of NAS Oceana on Brant Island Shoal in Pamlico Sound, Pamlico County, North Carolina. The range is an entirely marine environment located approximately 3 miles off shore of Goose Creek Island. BT-9 is defined by a surface water prohibited area designated by the United States Army Corps of Engineers (USACE), Wilmington District. This includes a circular area that is centered on the south side of the Brant Island Shoal and extends for a radius of three statute miles and is closed to water navigation at all times. The average water depth in the area is approximately 7 feet.

BT-9 is an unmanned submerged ship hull target for conventional weapons delivery. Explosive ordnance is limited to 100 pounds of TNT or its equivalent. Total target range activity at BT-9 by all DoD aircraft was summarized by Sirrine (1991). Average monthly inert ordnance use for a four-month period in 1990 consisted of 636 practice bombs (types MK-76/BDU-33, BDU-45, BDU-48, MK-81, MK-82, MK-83, and MK-84), 46 inert rockets (2.75- and 1.5-inch Zuni), 21,000 strafing rounds (0.50 caliber, 7.62 mm, 20 mm, and 30 mm), three TOW missiles, 179 flares, and 180 chaff. Table 3.1-7 provides a description of these ordnance types. The practice bombs are made of inert materials, typically a metal body filled with sand and/or water, and usually carry a small signal cartridge that marks the point of impact. Three different signal cartridges, the MK-4, CXU-3, and CXU-4, are used with the practice bombs. The MK-4 cartridge contains approximately 65 grams of red phosphorus,

Table 3.1-7

A DESCRIPTION OF ORDNANCE TYPICALLY USED AT BT-9

Ordnance	Description
MK76 Practice Bomb	25-pound teardrop-shaped cast metal bomb body with a bore tube for installation of a signal cartridge.
BDU 33 Practice Bomb	Air Force designation for MK 76 practice bomb.
BDU 48 Practice Bomb	10-pound metal cylindrical bomb body with a bore tube for installation of a signal cartridge.
BDU 45 Practice Bomb	500-pound metal bomb body either sand or water filled. configured with either low drag conical tail fins or high drag tail fins for retarded weapon delivery. Two signal cartridges installed.
MK 81 Practice Bomb	250-pound inert bomb.
MK 82 Practice Bomb	500-pound inert bomb.
MK 83 Practice Bomb	1,000-pound bomb configured like BDU 45 (conical fins only).
MK 84 Practice Bomb	2,000-pound bomb configured like BDU 45 (conical fins only).
2.75-inch/1.25-inch Zuni	Inert 7-pound rocket.
0.50 cal 7.62 mm 20 mm 30 mm	Inert machine gun rounds.
TOW	Wire guided 56-pound anti-tank missile.
SP Flare	Aerial flare.
Chaff LUU-2	18-pound chaff canister.

Source: Sirrine 1991.

a compound that produces a bright flash (for night use) and white smoke (for day use) when ignited on impact. The CXU-3 and CXU-4 cartridges contain approximately 1 fluid ounce and 2 fluid ounces, respectively, of titanium tetrachloride, a liquid that produces white smoke when exposed to air or moisture.

This range is administered by MCAS Cherry Point Range Control and is scheduled in 20-minute blocks. Based upon current personnel levels, the targets are available for use from 8:00 a.m. to 10:00 p.m. on Monday through Thursday, and from 8:00 a.m. to 3:00 p.m. on Friday. Additional times of operation may be scheduled if coordinated with MCAS Cherry Point Range Control.

Land Use

Land use in proximity to BT-9 primarily includes marshlands to the west of the range on Goose Creek Island (see Figure 3.1-7). Activities in these areas primarily include resource-based recreational uses such as hunting and fishing. Communities in the vicinity of BT-9 include Hobucken, Bayboro, Hollyville, Vandermere, Stonewall, and Alliance, all of which are located approximately 7 to 15 miles (11 to 24 kilometers) west of the range in Pamlico County. The nearest occupied structure is 7 miles from the range in Hobucken.

Water Quality

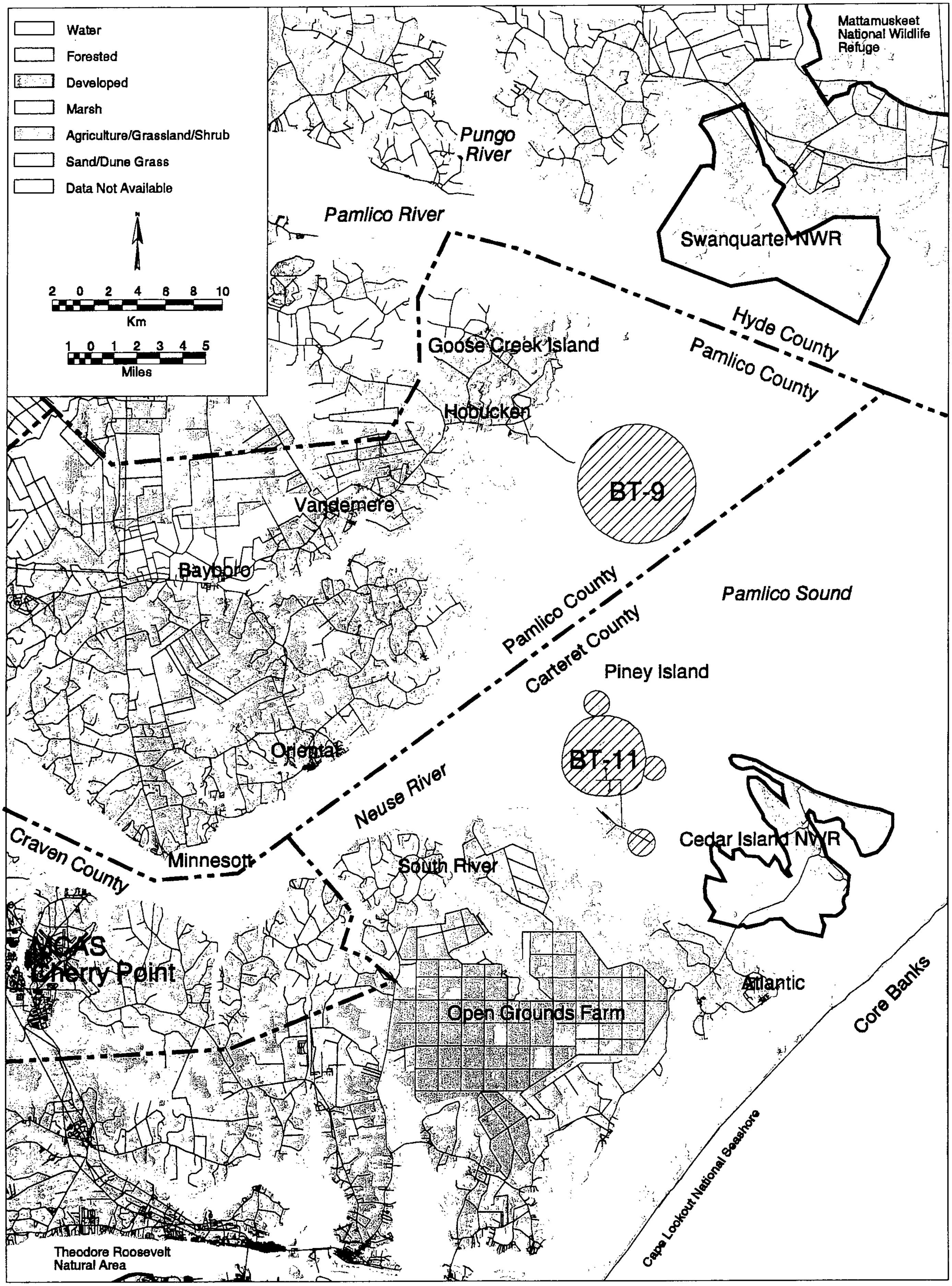
The Pamlico and Neuse rivers flow into Pamlico Sound (actually an estuary) from the west, and Drum, Ocracoke, Hatteras, and Oregon inlets connect the sound with the Atlantic Ocean to the east. Pamlico Sound extends nearly 100 miles (161 kilometers) from north to south and is more than 25 miles (40 kilometers) wide in places. Despite its large size (over 2,000 square miles [5,200 kilometers]), the sound is fairly shallow, having a mean depth of only 15 feet. The drainage basin of Pamlico Sound includes 36,000 square miles in northeastern North Carolina and southeastern Virginia, including the drainage area of Albemarle Sound, which, in the absence of ocean outlets in the northern Outer Banks, flows south into Pamlico Sound.

Pamlico Sound receives the inflow of the Neuse and Pamlico rivers, including the pollutant loads carried by these rivers. In 1991, there was a total (military and nonmilitary) of 429 active, permitted point-source discharges in the Neuse watershed, which contributed an average of 200 million gallons per day of treated wastewater to the Neuse River (Pamlico-Tar River Foundation 1991a), and 148 active, permitted point-source discharges to the Tar-Pamlico watershed, which contributed 70 million gallons of treated wastewater per day to the Pamlico River (Pamlico-Tar River Foundation 1991b). In addition to point-source pollution,

the Neuse and Pamlico rivers also receive nonpoint-source pollution, including nutrients from farm and forestry land use; waste from livestock feed lots; automotive chemicals from paved areas; and sediment from fields, construction sites, and other cleared areas. As a result of pollutant inputs from these rivers, water quality has been compromised in portions of Pamlico Sound.

One of the most comprehensive studies of water quality in Pamlico Sound was the Albemarle-Pamlico Estuarine Synoptic Study of 1989 (Waite et al. 1994; Sirrine 1991) sponsored by the North Carolina Department of Environment, Health, and Natural Resources (NCDEHNR). This study included the concurrent collection of surface water from 128 locations in the Albemarle and Pamlico estuaries in July 1989. The samples were analyzed for dissolved oxygen, pH, conductance, salinity, major ions, nutrients, metals, and other measures of water quality. Four of the sampling locations were located along a transect extending from the north end of Piney Island toward BT-9. Water quality parameters measured at these locations, along with North Carolina water quality standards for the protection of aquatic life, are summarized in Table 3.1-8. None of the measured parameters exceeded the available standards. The data in Table 3.1-8 provide one baseline for assessing changes in water quality near BT-9 and BT-11.

In 1990, a study conducted by Sirrine Environmental Consultants (Raleigh, NC) for the US Navy compared contaminant levels in surface water from Palmetto Point, Stumpy Point, Brant Island (BT-9), and Piney Island (BT-11) target ranges with those at reference locations in Pamlico Sound (Sirrine 1991). The water samples were analyzed for soluble metals (aluminum, chromium, copper, iron, lead, magnesium, nickel, silver, and zinc), sulfate, sulfide, total ammonia nitrogen, 31 volatile organic compounds (by EPA scan 624), and 57 semivolatile organic compounds (by EPA scan 625). Sediment samples also were collected from the ranges (except BT-11) and reference areas and were analyzed for the soluble metals listed above, sulfate, and sulfide. No significant differences in any sediment parameters were identified between the range and reference areas samples. Differences in pH, temperature, sulfate, turbidity, and ammonia were identified between surface water samples collected from BT-9 and samples collected from Pamlico Sound reference areas. The differences in pH, temperature, and sulfate likely resulted from different mixtures of salt water and fresh water at BT-9 and the reference areas. The higher turbidity level at BT-9 probably resulted from greater sediment resuspension at that location, since water depth was more shallow at BT-9 than at the reference areas. The higher total ammonia nitrogen level at BT-9 is attributed to sources such as agricultural runoff and/or municipal wastewater treatment plants (Sirrine 1991). Overall, the statistical comparisons between BT-9 and the



Source: NC Center for Geographic Information and Analysis 1996

Figure 3.1-7
Generalized Surrounding Land Use - BT-9 & BT-11

Table 3.1-8

WATER QUALITY CONCENTRATIONS IN PAMLICO SOUND NEAR BT-9 AND BT-11

Parameter (units)	Measured Value[a]	Water Quality Standard for Protection of Aquatic Life[b]
Physical and Biological Parameters		
Temperature (°C)	27.5 to 27.8	32
Suspended residue (mg/l)	5 to 12	NA
Secchi disk depth (m)	1 to 1.1	NA
Turbidity (NTU)	2 to 3.2	25
Conductance (μmhos/cm)	24,000 to 24,800	NA
Salinity (parts per thousand)	14.3 to 14.8	No appreciable change allowed
pH (pH units)	7.0 to 7.2	6.8 to 8.5
Dissolved oxygen (mg/l)	6.0 to 6.6	5.0
Fecal coliform bacteria (per 100mL)	< 10	14
Chlorophyll-a (μg/l)	8 to 25	40
Major Ions		
Chlorides (mg/l)	9,200 to 9,600	NA
Sulfate (mg/l)	930 to 1,200	NA
Nutrients		
Total ammonia nitrogen (mg N/l)	0.01 to 0.04	NA
Total Kjeldahl nitrogen (mg N/l)	0.4 to 0.5	NA
Nitrate + nitrite nitrogen (mg N/l)	0.01	NA
Total phosphorus (mg P/l)	0.08 to 0.1	NA
Orthophosphate (mg P/l)	0.04 to 0.06	NA
Total organic carbon (mg/l)	< 5	NA
Metals		
Aluminum (μg/l)	< 50 to 71	NA
Arsenic (μg/l)	< 10	50
Beryllium (μg/l)	< 25	NA
Cadmium (μg/l)	< 2	5.0
Chromium (μg/l)	< 25	20
Cobalt (μg/l)	< 50	NA
Copper (μg/l)	< 2 to 2.6	3.0
Iron (μg/l)	< 50 to 74	NA

Table 3.1-8

WATER QUALITY CONCENTRATIONS IN PAMLICO SOUND NEAR BT-9 AND BT-11

Parameter (units)	Measured Value[a]	Water Quality Standard for Protection of Aquatic Life[b]
Lead (μg/l)	< 10	25
Manganese (μg/L)	28 to 45	NA
Mercury (μg/l)	< 0.2	0.025
Nickel (μg/l)	< 10	8.3
Zinc (μg/l)	< 10	86

[a]Range of four samples collected between Brant Island Shoal (BT-9) and Piney Island (BT-11) as part of the Albemarle-Pamlico Estuarine Synoptic Survey of 1989.

[b]State of North Carolina Rules .0220 and .02221, Tidal Salt Water Quality Standards for Class SC and SA Waters, respectively.

Key:

< = Less than.
°C = Degrees centigrade.
m = Meter.
mg/l = Milligrams per liter.
mg N/l = Milligrams nitrogen per liter.
mg P/l = Milligrams phosphorus per liter.
ml = Milliliter.
NA = Not available.
NTU = Nephelometric Turbidity Units
μg/l = Micrograms per liter.
μmhos/cm = Micromhos per centimeter.

Source: NCDEHNR 1996a; Sirrine 1991.

reference areas did not identify any differences in water or sediment parameters that could be attributed to the use of the area for training.

Aquatic Resources

Pamlico Sound supports some of the most important commercial and recreational fisheries in the state of North Carolina. Consequently, both commercial and recreational fishing are primary sources of employment and income in the region. Data on fisheries landings and activities in North Carolina are available from the National Marine Fisheries Service (NMFS 1997). The value of commercial fisheries landings for North Carolina increased from $71 million in 1990 to $110 million in 1995. A large portion of the increase in value of commercial harvest was due to sharp increases in the value of blue crab (*Callinectes sapidus*); landings, which increased from $9 million to $34.5 million, and shrimp (*Peneaus spp.*) landings, which increased from $13 million to $20 million.

Although data for Pamlico Sound harvest (exclusive of other coastal areas) are not available, the top ten species (by dollar value of harvest) harvested within 0 to 3 miles from shore in North Carolina are presented in Table 3.1-9. Pamlico Sound is a significant part of

Table 3.1-9

TOTAL LANDINGS AND VALUE FOR NORTH CAROLINA COMMERCIAL FISHERIES, 1995 FROM 0 TO 3 MILES FROM SHORE

Species	Scientific Name	Catch (pounds x 1,000)	Value ($ x 1,000)
Blue crab	*Callinectes sapidus*	48,752	28,035
Shrimp	*Peneaus spp.*	8,524	21,564
Hard-shelled clam	*Mercenaria mercenaris*	3,241	16,496
Flounder	*Paralichthys spp.*	4,728	7,873
Atlantic menhaden	*Brevoortia tyrannus*	59,871	2,241
Mullet	*Mugil spp.*	2,300	1,538
Weakfish	*Cynoscion regalis*	2,405	1,355
Spot	*Leiostomus xanthurus*	2,954	994
Atlantic croaker	*Micropogonias undulatus*	2,147	749
Spotted seatrout	*Cynoscion nebulosus*	569	686

Source: National Marine Fisheries Service (NMFS 1997).

this inshore fishery, and the species composition of the Sound is likely similar to that of coastal North Carolina. Approximately 76% of the commercial value for the fishery is for shellfish, primarily blue crabs, shrimp, and clams (*Mercenaria mercenaria*). Crabs are harvested by trawlers and crab pots; shrimp are harvested primarily with trawlers; and clams are harvested by hand or with mechanical harvesters. Finfish species are harvested with long-haul seine or pound nets (LANTDIV 1989).

The recreational fisheries of Pamlico Sound are also a significant source of income for the region and the state. The Marine Recreational Fisheries Statistics Survey (NMFS 1997) provides information on landings and angler effort for recreational fisheries in the inland marine waters (including bays, sounds, and estuaries) of North Carolina. A variety of species are pursued by recreational anglers, including some that are important commercial species. Table 3.1-10 presents the top ten species by number of fish caught in 1995 in the North Carolina inland marine waters. Important noncommercial fisheries also exist for blue crabs and hard-shelled clams.

An estimated 978,263 angler trips were made to the inland marine waters of North Carolina in 1995. These angler trips contribute to the local economy through purchases of

Table 3.1-10

**TOTAL CATCH FOR NORTH CAROLINA RECREATIONAL FISHERIES, 1995
INLAND WATERS (BAYS, SOUNDS, ESTUARIES)**

Species	Scientific Name	Catch (Number of Fish x 1000)
Pinfish	*Lagodon rhomboides*	1,079
Atlantic croaker	*Micropogonias undulatus*	1,014
Spot	*Leiostomus xanthurus*	892
Pigfish	*Orthopristis chrysoptera*	588
Flounder	*Paralichthys spp.*	456
Spotted seatrout	*Cynoscion nebulosus*	250
Black sea bass	*Centropristis striata*	180
Bluefish	*Pomatomus saltatrix*	134
Weakfish	*Cynoscion regalis*	103
Silver perch	*Bairdiella chrysura*	93

Source: NMFS 1997.

bait and tackle, and fees for fishing piers or jetties, charter boats, and boat rentals. Private boats and boat rentals account for approximately 61% of total fishing trips to inland waters, while fishing from piers, bridges, jetties, or other man-made structures represents about 28% of trips. Other important modes of recreational fishing include beach/bank fishing (approximately 10% of trips) and charter boat trips (1%).

The National Marine Fisheries Service was contacted regarding the occurrence of threatened and endangered species at the BT-9 target range. Among the species known to occur in North Carolina, only the green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempi*), and the loggerhead sea turtle (*Caretta caretta*) were identified as commonly occurring in Pamlico Sound (Brown, J. 1996).

The green sea turtle is a large marine turtle that inhabits tropical and subtropical waters throughout the world (NMFS/USFWS 1991a). Nesting occurs on high-energy, oceanic beaches, usually on islands. In the United States, green sea turtle nesting is limited to the east coast of Florida, Puerto Rico, and the U.S. Virgin Islands (NMFS/USFWS 1991a). Young turtles are pelagic, traveling long distances in the open ocean. Adults are primarily herbivorous and will enter shallow bays and estuaries to feed on pastures of sea grasses and algae (Ernst and Barbour 1972).

Kemp's ridley sea turtle is the smallest of the marine turtles and is limited in range primarily to the western Atlantic and Gulf of Mexico (Ernst and Barbour 1972). The nesting range of this species is essentially limited to beaches of the western Gulf of Mexico in the Mexican state of Tamaulipas. Although individual Kemp's ridleys have been seen along the eastern seaboard as far north as South Carolina, adults are usually confined to the Gulf of Mexico (NMFS/USFWS 1992). Adults are usually found over sandy or muddy bottoms where they feed primarily on crabs and mollusks. Juveniles may frequent bays, coastal lagoons, and river mouths (NMFS/USFWS 1992).

The loggerhead sea turtle is found in tropical to temperate waters of the Atlantic, Pacific, and Indian oceans (Ernst and Barbour 1972). Nesting is confined to the temperate and subtropical zones. Nesting in the United States occurs primarily in Florida (which accounts for 80% of U.S. nesting) and in Georgia, South Carolina, and North Carolina (NMFS/USFWS 1991b). Females typically nest on high-energy beaches on the ocean side of barrier islands (NMFS/USFWS 1991b). Juvenile loggerheads are pelagic, drifting with *Sargassum* raft communities for several years. Adults feed on mollusks, crustaceans, and other marine invertebrates in near-shore and estuarine environments.

Air Quality

Aircraft from NAS Oceana, MCAS Cherry Point, and other East Coast bases fly sorties in BT-9 for training missions. Engine exhaust from these aircraft operations contribute air pollutants to the atmosphere. These pollutant emissions are measured within the "mixing layer", the air layer extending from ground level to the average maximum height in the atmosphere where emissions will still affect ground level pollutant concentrations. The mixing layer height at BT-9 extends from ground level to 3,000 feet above ground level (AGL).

Aircraft operating in BT-9 remain above 3,000 feet AGL unless performing a practice bombing or strafing operation. During these practice operations, aircraft typically descend below 3,000 feet and conduct cruise, dive, climbout, and return to cruise maneuvers. After completion, aircraft ascend above 3,000 feet (Thompson 1996).

1997 emission calculations for maneuvers below 3,000 feet AGL are based on the number of annual operations below 3,000 feet AGL, aircraft engine fuel usage, and air pollutant emission factors specific for each engine type. Estimates of total annual range operations were provided in the NASMOD analysis (ATAC 1997). Estimates of the percentage of total annual range operations below 3,000 feet AGL were provided by COMNAVAIRLANT. Appropriate aircraft engine fuel usage and emission factors presented in Appendix E were used in the analysis.

Existing emissions from target operations in BT-9 are presented in Table 3.1-11. Emissions of VOCs, NOx, SO_2, and PM_{10} are each below 1 ton per year. Emissions of CO slightly exceed 1 ton per year.

3.1.3.2 BT-11 (Piney Island)

BT-11 is located within R-5306A, in Carteret County, North Carolina (see Figure 3.1-8). The range encompasses all of Piney Island near the mouth of the Neuse River. The range area is approximately 12,500 acres (5,059 hectares) and is used for air-to-ground weapons training.

The area surrounding the range is controlled by both surface prohibited and restricted areas. Surface prohibited areas are designated within a 1.8-statute-mile radius of a target in Rattan Bay, and within a circular area with a radius of 0.5 statute mile centered on Mulberry Point and Turnagain Bay. Surface restricted areas with 0.5-mile radii are located west of Point of Marsh, at Newstump Point, West Bay, and Jacks Bay. These areas are used for bombing, rocket firing, and strafing with inert ammunition. These surface restricted areas are open to water navigation at night when training is not conducted.

Table 3.1-11

EXISTING EMISSIONS AT BT-9

Aircraft Type	Annual Operations Below 3,000 ft.[a]	VOC (tons/yr)	NO_x (tons/yr)	CO (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)
F-14B/D	6	0.0004	0.0096	0.0012	0.0003	0.0022
F/A-18	23	0.0062	0.0299	0.0153	0.0007	0.0074
AV-8	263	0.0199	0.1479	0.1433	0.0071	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10[b]	110	0.0067	0.0174	0.0543	0.0015	0.0078
F-16	23	0.0002	0.0275	0.0028	0.0004	0.0005
F-15	3	0.0000	0.0037	0.0004	0.0001	0.0001
All Helos[c]	275	0.0950	0.2284	0.9082	0.0303	0.0000
Other Jets	22	0.0013	0.0005	0.0098	0.0001	0.0010
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total[d]	**735**	**0.1323**	**0.4681**	**1.1403**	**0.0407**	**0.0190**

a Percentage of annual operations below 3,000 ft. obtained from NAVAIRLANT except as noted below.
b Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
c Assumed all helicopter operations are below 3,000 ft.
d Figures may not total due to rounding.

Key:

CO = Carbon monoxide.
NO_x = Nitrogen oxides.
PM_{10} = Particulate matter.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compounds.

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The range is a multipurpose target complex. It consists of both water- and land-based targets including 800- and 500-foot bullseyes; submerged barges and PT boat targets; a simulated runway target; a fuel farm target; and a surface-to-air missile (SAM) target (see Figure 3.1-8).

Authorized ordnance delivery maneuvers at BT-11 include conventional weapons delivery, special weapons delivery, and multi-aircraft strikes. Typical target-range activity by all DoD aircraft at BT-11 was summarized by Sirrine (1991). Average monthly ordnance use for a four-month period in 1990 consisted of 1,641 practice bombs (types MK-76/BDU-33, BDU-45, BDU-48, MK-81, and MK-82), 200 inert rockets (2.75-inch Zuni), 28 white-phosphorus rockets, 50,000 strafing rounds (0.50 caliber, 7.62 mm, 20 mm, and 30 mm), four TOW missiles, 104 flares, 33 smoking flares (SMD SAMS), and 158 chaff. Table 3.1-12 provides a description of these ordnance types. The practice bombs are made of inert materials, typically a metal body filled with sand and/or water, and usually carry a small signal cartridge that marks the point of impact. Three different signal cartridges, the MK-4, CXU-3, and CXU-4, are used in the practice bombs. The MK-4 cartridge contains approximately 65 grams of red phosphorus, a compound that produces a bright flash (for night use) and large volumes of white smoke (for day use) when ignited on impact. The CXU-3 and CXU-4 cartridges contain approximately 1 fluid ounce and 2 fluid ounces, respectively, of titanium tetrachloride, a liquid that produces large volumes of white smoke when exposed to air or moisture. The white-phosphorus rockets contain white phosphorus, a wax-like solid that ignites spontaneously in air, producing a white cloud.

This range is administered by MCAS Cherry Point Range Control and scheduled in 20-minute blocks. The targets are available for use from 8:00 a.m. to 10:00 p.m. on Monday through Thursday, and from 8:00 a.m. to 3:00 p.m. on Friday; although, as at BT-9, additional times may be scheduled with proper coordination.

Land Use

BT-11 is bordered on the north, east, and west by Pamlico Sound, and by marshlands on the south (see Figure 3.1-8). Activities in these areas are predominantly resource-based recreational uses such as hunting and fishing. The Open Grounds Farm, a large agricultural site, is located south of the range. Communities in the vicinity of BT-11 include Oriental (Pamlico County), located approximately 10 miles (17 km) west of the range, South River (Carteret County), located 7 miles (12 km) west of the range, and Atlantic (Carteret County), located 9 miles (15 km) southeast of the range.

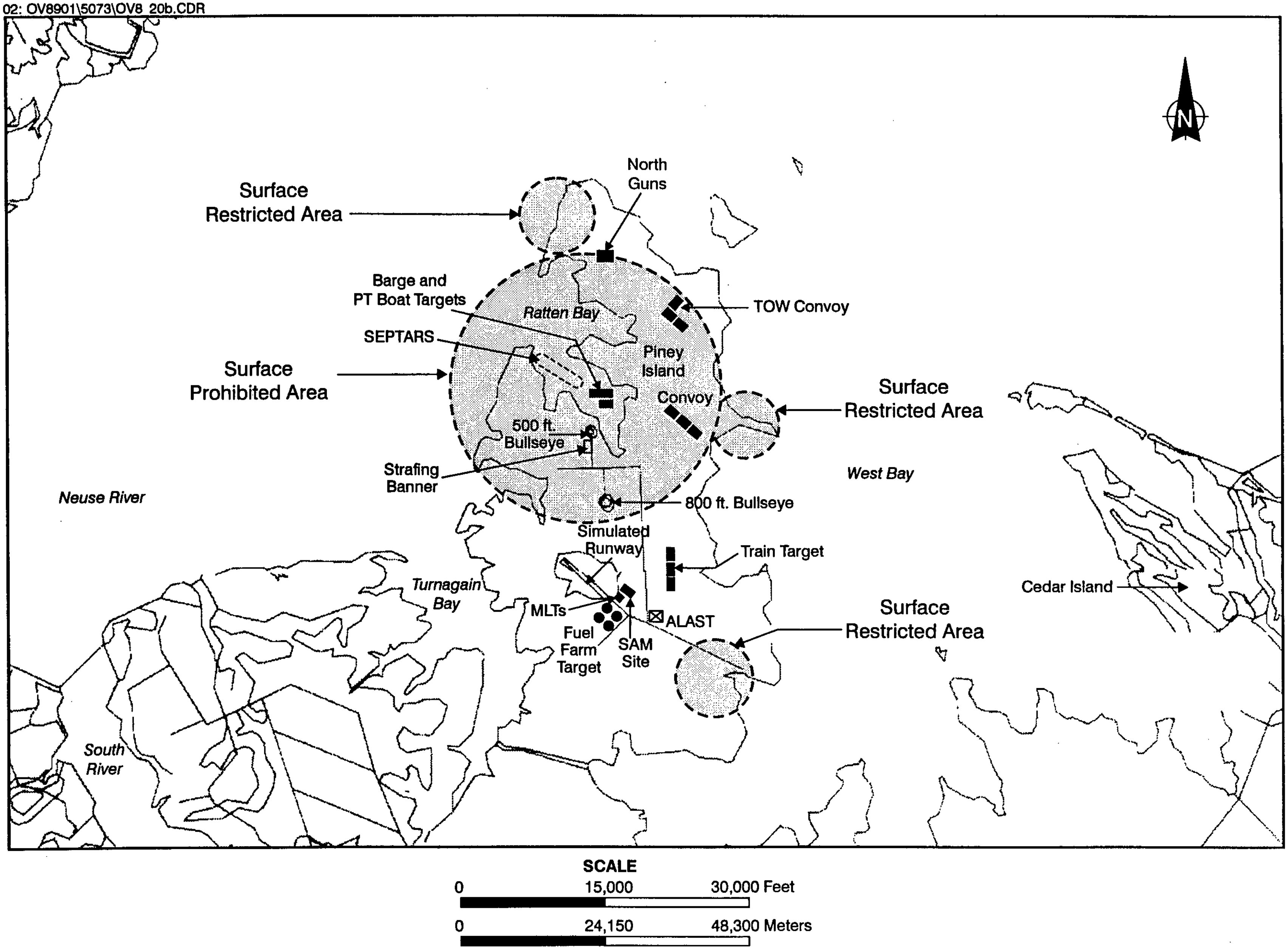

Figure 3.1-8 BT-11 (PINEY ISLAND)

Table 3.1-12

A DESCRIPTION OF ORDNANCE TYPICALLY USED AT BT-11

Ordnance	Description
MK76 Practice Bomb	25-pound teardrop-shaped cast metal bomb body with a bore tube for installation of a signal cartridge.
BDU 33 Practice Bomb	Air Force designation for MK 76 practice bomb.
BDU 48 Practice Bomb	10-pound metal cylindrical bomb body with a bore tube for installation of a signal cartridge.
BDU 45 Practice Bomb	500-pound metal bomb body either sand or water filled. Configured with either low-drag conical tail fins or high-drag tail fins for retarded weapon delivery. Two signal cartridges installed.
MK 81 Practice Bomb	250-pound inert bomb.
MK 82 Practice Bomb	500-pound inert bomb.
2.75-inch Zuni	Inert 7-pound rocket.
WP-2.75-inch	White phosphorous 7-pound rocket.
0.50 cal 7.62 mm 20 mm 30 mm	Inert machine gun rounds.
TOW	Wire guided 56-pound anti tank missile.
SP Flare	Aerial flare.
SMD SAMS	1.5-pound smoking flare.
LUU-2	18-pound chaff canister.

Source: Sirrine 1991.

Water Quality

Piney Island is separated from the mainland by Indian Ditch, a narrow channel located along the island's south side that was widened in 1970 to make it navigable for small boats (LANTDIV 1988a). The rest of Piney Island is surrounded by the estuarine waters of Pamlico Sound. The water quality of Pamlico Sound in the vicinity of Piney Island is described above in the discussion of water quality at BT-9 (see Section 3.1.3.1).

In 1990, a focused study was conducted by the U.S. Navy to identify any water-quality impacts resulting from military training activities at Piney Island (Sirrine 1991). The study included the collection of surface water samples from three locations near the bombing targets in Rattan Bay and three reference locations southwest of Piney Island in Turnagain Bay. Sediment samples were not collected. The water samples were analyzed for soluble metals (aluminum, chromium, copper, iron, lead, magnesium, nickel, silver, and zinc), sulfate, sulfide, total ammonia nitrogen, 31 volatile organic compounds (by EPA scan 624), and 57 semivolatile organic compounds (by EPA scan 625). Volatile and semivolatile organic compounds were not detected in surface water samples from the impact or reference areas. Analytical differences between the areas were identified only for the following surface-water parameters: dissolved oxygen, temperature, conductance, aluminum, and zinc. The differences in temperature and conductance between the impact and reference areas were attributed to different mixtures of saltwater and fresh water at the areas (Sirrine 1991). Compared with the reference area, the aluminum concentration was lower and the dissolved oxygen concentration was higher at the impact area. Although the soluble zinc level was higher at the impact area (67 $\pm$ 6 μg/l) compared with the reference area (53 $\pm$ 6 μg/l), the level did not exceed the North Carolina water quality criterion for zinc for the protection of aquatic life (86 μg/l). Overall, the study did not identify any water-quality impacts at BT-11 that could be attributed to use of the area for military training.

Aquatic Resources

The majority of Piney Island is a nontidal brackish marsh and is ecologically similar to nearby Cedar Island National Wildlife Refuge (NWR). Brackish marshes can be important habitat for many species of aquatic invertebrates and fish. Among the invertebrate species known to extensively utilize brackish marsh habitat are blue crabs (*Callinectes sapidus*), ribbed mussels (*Modiolus demissus*), and marsh periwinkle (*Littorina irrorata*) (Spitsbergen 1980). Several fish species also are commonly found in brackish marsh habitat. At Cedar Island NWR, common fish species include the mosquito fish (*Gambusia affinis*), killifish

(*Fundulus spp.*), and sheepshead minnow (*Cyprinodon variegatus*) (Marraro et al. 1991). These fish species use brackish marsh habitat in the early postlarval, juvenile, and adult life stages. Numerous other species of fish, including several of commercial or sport-fishing importance, were found to utilize the creeks and small bays of Cedar Island NWR on a temporary basis or as nursery locations. These species include flounder (*Paralichthys spp.*), spotted sea trout (*Cynoscion nebulosus*), American eel (*Anguilla rostrata*), mullet (*Mugil spp.*), Atlantic silversides (*Menidia menidia*), and pinfish (*Lagodon rhomboides*) (Marraro et al. 1991).

In the late 1960s, approximately 8 miles of canals were excavated through the interior of Piney Island to provide material for a road network. These 30-foot-wide, 8-foot-deep canals are hydrologically connected to the numerous bays located around the island and, thus, are brackish water environments. In addition, a number of small depressions created by past use of live ordnance are located throughout the interior of the island. Frequently flooded, these depressions are now considered brackish water wetlands and support plant species typically found in brackish marsh habitats (LANTDIV 1989).

The fisheries and threatened and endangered species of Pamlico Sound around BT-11 are similar to those described above for the BT-9 range (see Section 3.1.3.1).

Terrestrial Resources

Soils. Piney Island is low and flat, ranging only from zero to 3 feet above sea level. The entire surface of the island is subject to flooding, although daily tidal flooding occurs only along the shoreline and near tidal creeks (LeBlond et al. 1994). The remaining areas are infrequently flooded by storm events or exceptionally high tides. Wind direction can have an important impact on the frequency and duration of flooding. In particular, the winds from the north or northeast tend to produce the greatest degrees of flooding at Piney Island. The dominant soil type on the island is the level, very poorly drained Lafitte muck (LeBlond et al. 1994). This soil has a very high organic-matter content in the surface layers and is slightly to moderately alkaline. Two areas of the level, very poorly drained Dare muck are present in the south-central portion of the island. This muck also has a very high organic-matter content but is extremely acidic. All of the soils on the island are subject to frequent ponding because of fluctuations in the water table, which is at or near the ground surface.

Vegetation. Piney Island is vegetated with three predominant cover types: irregularly flooded needlerush marsh, maritime shrub thicket (also known as estuarine shrub scrub), and pond pine woodland (also known as estuarine forest) (see Figure 3.1-9). The primary land cover is needlerush marsh, with maritime shrub thicket occupying slightly elevated areas

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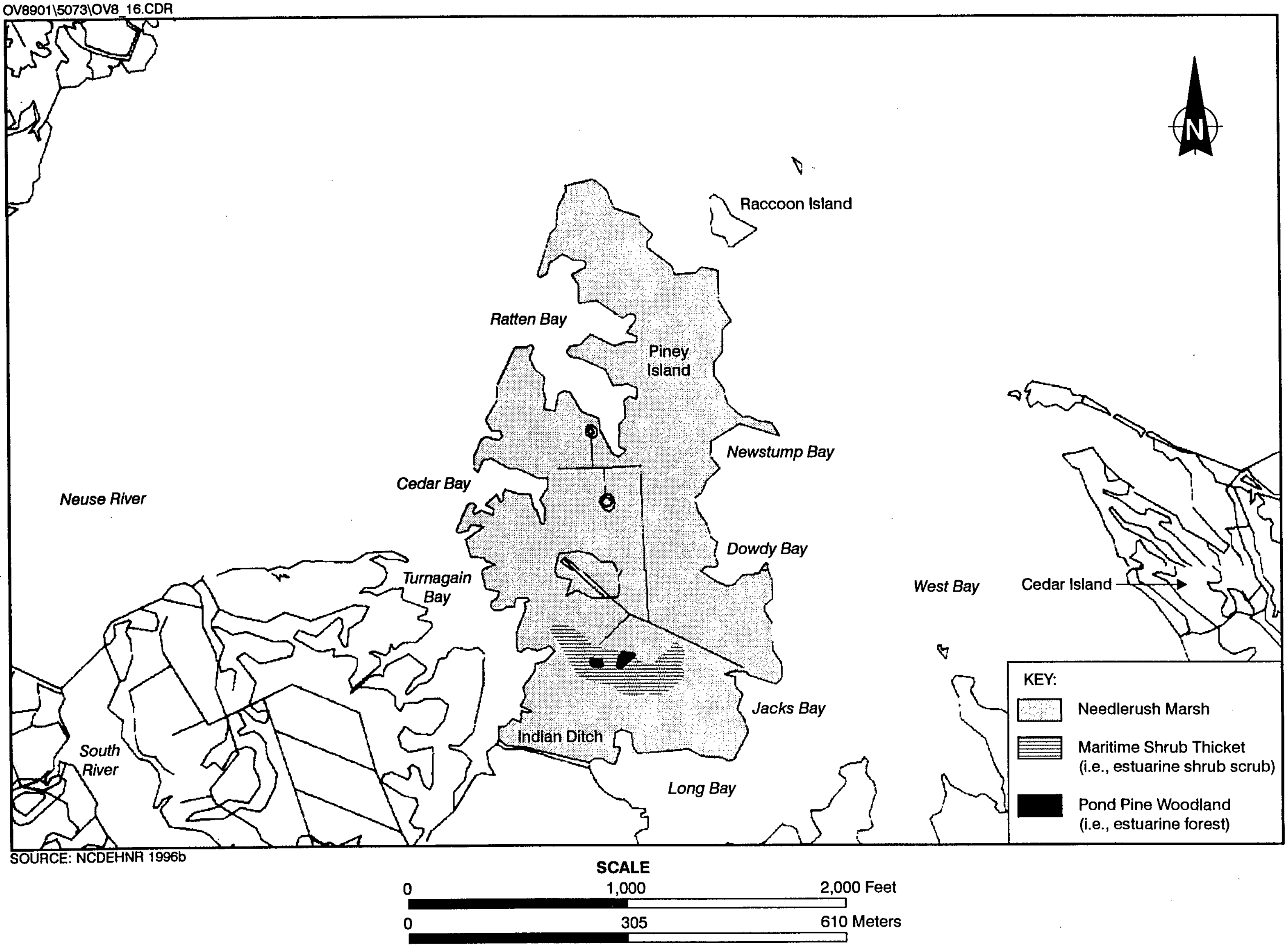

SOURCE: NCDEHNR 1996b

Figure 3.1-9 VEGETATIVE COVER TYPES FOR BT-11 (PINEY ISLAND)

in the south-central portion of the island and pond pine woodland occupying a small inclusion of the Dare muck soil type, also in the south-central portion of the island.

The needlerush community that covers most of Piney Island represents one of the largest remaining nontidal brackish marshes in North Carolina. The quality of the marsh is high and it has been determined to be an exemplary natural community (LeBlond et al. 1994). This community, though dominated by black needlerush (*Juncus roemerianus*), typically exhibits zonation in vegetation as salinity and frequency of flooding change (Knowles 1991). At nearby and ecologically similar Cedar Island NWR, the vegetative zone closest to the shoreline is a nearly pure stand of black needlerush with spike grass (*Distichlis spicata*) as a subdominant (Knowles 1991). As the distance from shore increases, other species such as salt meadow hay (*Spartina patens*), saw grass (*Cladium jamaicense*), and big cord grass (*Spartina cynosuroides*) may be dominant in patches (LeBlond et al. 1994). Other herbaceous species of lesser importance include spike rush (*Eleocharis spp.*), broom sedge (*Andropogon spp.*), sedges (*Cyperus spp.*), and sea oxeye (*Borrichia frutescens*). A unique aspect of the Piney Island needlerush wetlands is that occasional fire started by flares or other ordnance helps promote the continuation of this vegetation community. Occasional fire may burn over large areas, consuming dead needlerush and other detritus, thus clearing away dead matter and allowing regeneration and revitalization of the needlerush (LANTDIV 1989).

The vegetative zone farthest from shore at Cedar Island NWR is characterized by the presence of shrub vegetation (Knowles 1991). At Piney Island this cover type is referred to as maritime shrub thicket or estuarine shrub scrub. Common shrub species include wax myrtle (*Myrica cerifera*), marsh elder (*Iva frutescens*), and eastern baccharis (*Baccharis halmifolia*). Common herbaceous species in this cover type include species also common in the needlerush marsh, such as black needlerush and salt meadow hay; however; additional species also may be present, including seaside goldenrod (*Solidago sempervirens*), switch grass (*Panicum virgatum*), and climbing hempweed (*Mikania scandens*).

A small area of Dare muck soil in the south-central portion of the island supports a pond pine woodland community (LeBlond et al. 1994). This community has an overstory dominated by pond pine (*Pinus serotina*) and an understory consisting of smaller pond pines, red maple (*Acer rubrum*), and swamp red bay (*Persea borbonia*). Shrub species such as wax myrtle and marsh elder also are present in the understory. The pond pine woodland community at Piney Island is considered a high-quality community, although it differs somewhat from mainland pond pine woodlands because of higher salinity and wetness and its isolated location (LeBlond et al. 1994).

Wildlife. Piney Island is a relatively remote area where human disturbances, other than those associated with military activities, are rare. The marshes at Piney Island and Cedar Island NWR represent large areas of relatively undisturbed marsh habitat. Consequently, wildlife species in the two areas are likely to be quite similar and consist primarily of animals adapted to wetland environments. A survey of birds and small mammals in the black needlerush marshes at Cedar Island NWR was conducted by Davis et al. (1991).

The study indicated that the most commonly observed birds at Cedar Island NWR are songbirds typical of emergent brackish marshes, including seaside sparrow (*Ammospiza maritima*), marsh wren (*Cistothorus palustris*), red-winged blackbird (*Agelaius phoenicus*), and common yellowthroat (*Geothlypis trichas*). Marsh birds also are common in these habitats, although many are not commonly observed due to their shy habits. Species observed at Cedar Island NWR include the black rail (*Laterallus jamaicensis*), clapper rail (*Rallus longirostris*), Virginia rail (*Rallus limicola*), and American bittern (*Botaurus lentiginosus*). Common wading bird species in the area include the black-crowned night-heron (*Nycticorax nycticorax*), yellow-crowned night-heron (*Nuctanassa violacea*), and great blue heron (*Ardea herodias*).

Although waterfowl typically do not utilize needlerush marsh habitat, some species will utilize the canals, small depressional wetlands, shorelines, and bay areas. The most frequently observed species at Cedar Island NWR are the American black duck (*Anas rubripes*), American widgeon (*Anas americana*), mallard (*Anas platyrhyncos*), and gadwall (*Anus strepera*). Other species observed at Piney Island include the northern harrier (*Circus cyaneus*), black skimmer (*Rhynchop niger*), common tern (*Sterna hirundo*), gull-billed tern (*Sterna nilotica*), and black-necked stilt (*Himantopus mexicanus*) (LeBlond et al. 1994).

The limited diversity of vegetation and lack of cover limits the suitability of Piney Island for large mammals. However, small mammals utilize the marshes and adjacent habitats. At nearby Cedar Island NWR, several mammals or their signs have been observed, including marsh rice rat (*Oryzomys palustris*), marsh rabbit (*Sylvilagus palustris*), nutria (*Myocastor coypus*), and raccoon (*Procyon lotor*).

Species of Concern and Significant Habitat Features. A survey of rare species and significant habitats at Piney Island was conducted by LeBlond et al. (1994). Several bird species of concern are known to occur on the island, including: the black rail, a federal-candidate species; two state-listed significantly rare species, the northern harrier and black-necked stilt; the black skimmer, a state-listed species of concern; and the gull-billed tern, a state-listed threatened species. In addition, two reptiles species of concern have been observed at the site: the diamondback terrapin (*Malaclemys terrapin*), a federal-candidate

species and state species of concern; and the Carolina water snake (*Nerodia sipedon williamengelsi*), a state species of concern. Table 3.1-13 presents a summary of animal species of concern at Piney Island. A single rare plant, the Gulf Coast spike sedge (*Eleocharis cellulosa*), a state-listed significantly rare species, also is present at Piney Island.

The black rail apparently nests and forages throughout the black needlerush marshes on Piney island, particularly in slightly elevated areas closer to the dikes and roads of the bombing range. Piney Island is believed to have one of the largest nesting populations of black rails in the United States (LeBlond et al. 1994). Northern harriers are known to nest and hunt in the black needlerush marsh areas on Cedar Island NWR, and evidence suggests that one or two pairs also breed at Piney Island (LeBlond et al. 1994). Black-necked stilts also appears to breed in the black needlerush marsh areas on Piney Island, especially near small open-water pools. Stilts prey on insects, crustaceans, and molluscs in the marsh areas and marsh edges.

A colony of nesting black skimmers (20 nests), gull-billed terns (eight nests), and common terns was observed on a sandy beach near Newstump Point on the east side of Piney Island. Although nesting of these species is limited to sandy areas, they appear to be common on Piney Island (LeBlond et al. 1994). The gull-billed tern may feed on flying insects and other invertebrates in the needlerush marshes, and skimmers feed over open water in the adjacent Pamlico Sound and Neuse River.

The diamondback terrapin is a brackish marsh species that feeds on small crabs, molluscs, and dead fish (Spitsbergen 1980). The marshes at Piney Island provide excellent habitat for the species, and many individuals and nests have been observed there (LeBlond et al. 1994). The Carolina water snake, also a brackish marsh species, occupies similar habitats as the diamondback terrapin. This species appears to be very common on Piney Island and feeds primarily on small fish.

In addition to the rare species identified by LeBlond et al. (1994), the North Carolina Natural Heritage Program identified the snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), and glossy ibis (*Plegadis falcinellus*) as state-listed species of concern that have been sighted at Piney Island (see Table 3.1-13). These species likely visit the island to feed on the various small fishes and invertebrates that inhabit the island's marshes.

Air Quality

As at BT-9, engine exhaust from aircraft operations at BT-11 contribute to air pollutant emissions. Aircraft models that currently operate in BT-11 are similar to those at

Table 3.1-13

STATE- AND FEDERALLY-LISTED ANIMAL SPECIES OCCURRING AT PINEY ISLAND/BT-11 CARTERET COUNTY, NORTH CAROLINA

Common Name	Scientific Name	Federal Status	State Status	Common Habitats
Bird Species				
Black rail	*Laterallus jamaicensis*	C	SR	BM, MST
Northern Harrier	*Circus cyaneus*	–	SR	BM, MST
Black-necked stilt	*Himantopus mexicanus*	–	SR	BM
Black skimmer	*Rhynchops niger*	–	SC	BCH, OW
Gull-billed tern	*Sterna nilotica*	–	T	BCH, BM, OW
Snowy egret	*Egretta thula*	–	SC	BM
Little blue heron	*Egretta caerulea*	–	SC	BM
Tricolored heron	*Egretta tricolor*	–	SC	BM
Glossy ibis	*Plegadis falcinellus*	–	SC	BM
Reptile/Amphibian Species				
Diamondback terrapin	*Malaclemys terrapin*	C	SC	BM, OW
Carolina water snake	*Nerodia sipedon williamengelsi*	–	SC	BM

Key:

Status
C = Federal candidate species.
SC = Species of concern.
SR = Significantly rare.
T = Threatened.

Habitats
BCH = Beach.
BM = Brackish marsh.
MST = Maritime shrub thicket.
OW = Open water.

Source: Couvillion 1996.

BT-9. Practice bombing and strafing operations are also conducted in the same manner as in BT-9 (Thompson 1996). Existing emissions from target operations in BT-11 are presented in Table 3.1-14. Emissions of VOCs, SO_2, and PM_{10} are each below 1 ton per year. Emissions of NOx and CO are approximately 1.5 tons per year and 2.3 tons per year, respectively. Emissions from targeting operations in BT-11 are greater than emissions in BT-9 because a greater number of AV-8 Harrier annual operations are conducted below 3,000 feet AGL.

3.1.3.3 Dare County Range

The Dare County Range is situated within the northern portion of R-5314 (specifically R-5314-A, D, E, and F) in Dare County, North Carolina. The range is administered by the U.S. Air Force and is scheduled on an exclusive-use basis for a variety of mission types, mostly involving air-to-ground training (Pickett 1996). The range encompasses 46,000 acres (18,616 hectares). The Air Force uses the southern portion, and the Navy uses the northern portion. Each range contains targets for weapons delivery practice and is authorized only for inert ordnance similar to that used at BT-11 (see Table 3.1-12). In accordance with Navy guidance, no ordnance shall be released onto the range unless it is approved by target controllers.

The range is available for use from 8:00 a.m. to 12 midnight on Monday through Thursday, and from 8:00 a.m. to 4:00 p.m. on Friday and Saturday. It is also available at other times and on Sunday with special prior scheduling.

Land Use

The Dare County Range is located on a broad, low, flat peninsula on the southern portion of the Dare County mainland (see Figure 3.1-10). The peninsula is bordered on the north by Albermarle Sound, on the west by Alligator River, and on the east and south by Croatan and Pamlico sounds. However, the target range's boundaries do not extend to the outer shoreline of the peninsula. Areas outside the actual target locations on the range are open to hunting under the North Carolina Gamelands Program.

Land immediately surrounding the Dare County Range is primarily forest and marshland within the Alligator River NWR. A portion of this refuge near U.S. Route 64 is leased for farming activities. Communities in the vicinity of the Dare County Range are Stumpy Point, located 3 miles (5 km) east of the range, and Manteo (Roanoke Island), located 10 miles (16 km) northeast of the range.

Table 3.1-14

EXISTING EMISSIONS AT BT-11

Aircraft Type	Annual Operations Below 3,000 ft.[a]	VOC (tons/yr)	NO_x (tons/yr)	CO (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)
F-14B/D	32	0.0022	0.0518	0.0062	0.0014	0.0119
F/A-18	32	0.0086	0.0417	0.0214	0.0009	0.0103
AV-8	1,822	0.1379	1.0239	0.9919	0.0495	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10[b]	120	0.0073	0.0190	0.0593	0.0016	0.0085
F-16	35	0.0004	0.0415	0.0043	0.0006	0.0008
F-15	24	0.0003	0.0288	0.0030	0.0004	0.0006
All Helos[c]	376	0.1299	0.3123	1.2418	0.0415	0.0000
Other Jets	9	0.0005	0.0002	0.0039	0.0000	0.0004
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total[d]	**2,460**	**0.2897**	**1.5224**	**2.3366**	**0.0962**	**0.0325**

[a] Percentage of annual operations below 3,000 ft. obtained from NAVAIRLANT except as noted below.
[b] Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
[c] Assumed all helicopter operations are below 3,000 ft.
[d] Figures may not total due to rounding.

Key:

CO = Carbon monoxide.
NO_x = Nitrogen oxides.
PM_{10} = Particulate matter.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compounds.

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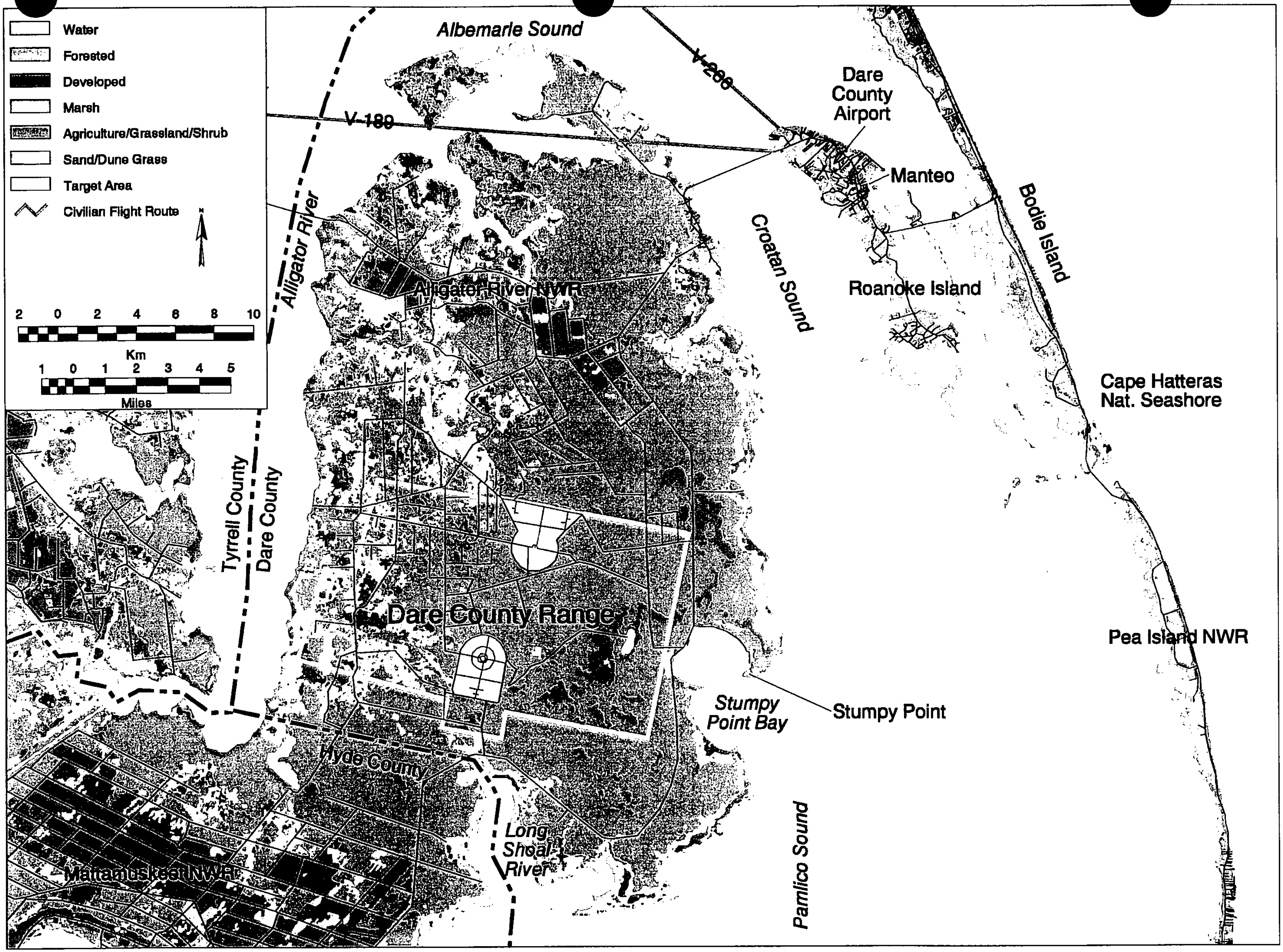
The Manteo/Dare County Regional Airport is a small, municipal airport located in the northern portion of Roanoke Island, west of the Dare County Range. The majority of the airport's traffic includes helicopters and small fixed-wing aircraft arriving and departing with air tours and advertisement banners and other general aviation traffic. The uncontrolled (i.e., no operational control tower) airport has two runways, Runway 04/22 and Runway 16/34. Runway 22 is the longest at 3,300 feet. The approach end of Runway 04 is about 6.5 nautical miles (NM) (runway heading) from the edge of R-5314. The airport is served by two published visual routes (V-189 and V-266) and has three published instrument approaches—two to Runway 16 and one to Runway 04. Due to its proximity to R-5314 (the air space above the Dare County Range), aircraft conducting IFR approaches to Runway 04 interact with the northeastern portion of the restricted airspace (ATAC 1997).

Radar-monitored instrument approaches to Manteo Airport are currently not available since Norfolk Approach Control cannot provide radar services in the area due to lack of radar coverage. Published approach procedures provide aviators with a safe means to arrive at an airport during inclement weather using air navigation aids such as a nondirectional beacon (NDB) or the global positioning system (GPS). In the case of Runway 04 instrument arrivals, the approach procedure dictates that aircraft make a procedural turn within 10 NM of the Manteo NDB. Federal Aviation Regulations mandate that all aircraft maintain a 3 NM lateral separation (unless otherwise indicated) from active restricted airspace and that military and civilian nonparticipating aircraft operating under IFR or VFR are not permitted within active restricted airspace boundaries. Therefore, if wind conditions require landing on Runway 04, one of two actions may be taken:

- R-5314 must be inactive (i.e., released back to its controlling agency, Washington Air Route Traffic Control Center [ARTCC] in this situation) prior to the commencement of a straight-in instrument approach to Runway 04; or
- The pilot performs a circling NDB approach to Runway 16 or a circling vector origination route (VOR)/GPS approach to Runway 16 with a landing on Runway 04 (ATAC 1997).

Currently, no procedures exist to allow for instrument approaches to Runway 04 when R-5314 is active. Pilots must exercise the second option described above. A procedure is currently being developed by the Air Force, Navy, and FAA to facilitate the release of R-5314 back to the FAA to accommodate instrument approaches to Runway 04. If both the Air Force and Navy ranges are clear, then the FAA is notified, and aircraft are cleared to enter the restricted airspace during the approach to Runway 04. If, at the time of request for



Source: NC Center for Geographic Information and Analysis 1996

Figure 3.1-10
Land Use/Land Cover - Dare County Range

an instrument approach to Runway 04, one of the ranges is not clear, the civilian aircraft must delay its approach until the activity at the range is complete, all military aircraft have cleared the airspace, and R-5314 is released back to the FAA (ATAC 1997).

This procedure is not ideal due to potential aircraft delay time, but it does accommodate both Manteo Airport traffic and Dare County Range military operations in a safe manner. Potential coordination conflicts between the Manteo Airport and the Dare County Range under instrument meteorological conditions have decreased since the Navy A-6 aircraft were retired from service (ATAC 1997).

Aquatic Resources

The Dare County Range is located on a peninsula surrounded by the Alligator River, Albemarle Sound, Croatan Sound, and Pamlico Sound. However, the actual target range is located in the interior of the peninsula and does not adjoin any of these major water bodies. Consequently, the aquatic resources of the range are limited to the streams and creeks that traverse the area such as Milltail Creek, Whipping Creek, Callaghan Creek, and Long Shoal River. Because of the low relief of the area, these blackwater streams have almost no perceptible flow during much of the year. In addition, these streams may occasionally experience reverse flow during high-wind tide events on the adjacent estuaries (Nature Conservancy 1995). Freshwater fish species in these streams include perch (*Perca spp.*), sunfish (*Lepomis spp.*), and bullheads (*Ictalurus spp.*) (USFWS 1986). The open-water bays and rivers surrounding the peninsula provide a protected and productive environment (e.g., submerged vegetation, shoals, etc.) for a variety of estuarine fish species and are considered the preferred areas in which the majority of these fish species congregate.

Terrestrial Resources

Soils. The land surface of the Dare County Range is low and relatively flat; elevations are generally less than 5 feet above sea level (Nature Conservancy 1995). The majority of the range is classified as wetland and is subject to periodic ponding and flooding. The water table is generally at or near the land surface. The area does not experience regular lunar tides, but wind direction and strength can have a significant influence on water levels. Strong southwesterly winds typically produce the highest water levels (Nature Conservancy 1995). The dominant soil series at the Dare County Range is Pungo, a deep (greater than 130 cm thick) organic peat. Other common soils include Ponzer and Belhaven, which are organic soils with slightly less deep (40 to 130 cm thick) organic layers; and Roper, a very poorly

drained mineral soil with a histic epipedon (an organic surface layer between 20 and 40 cm thick). Small areas of two very poorly drained mineral soils, Cape Fear and Hyde, also are present at the Dare County Range.

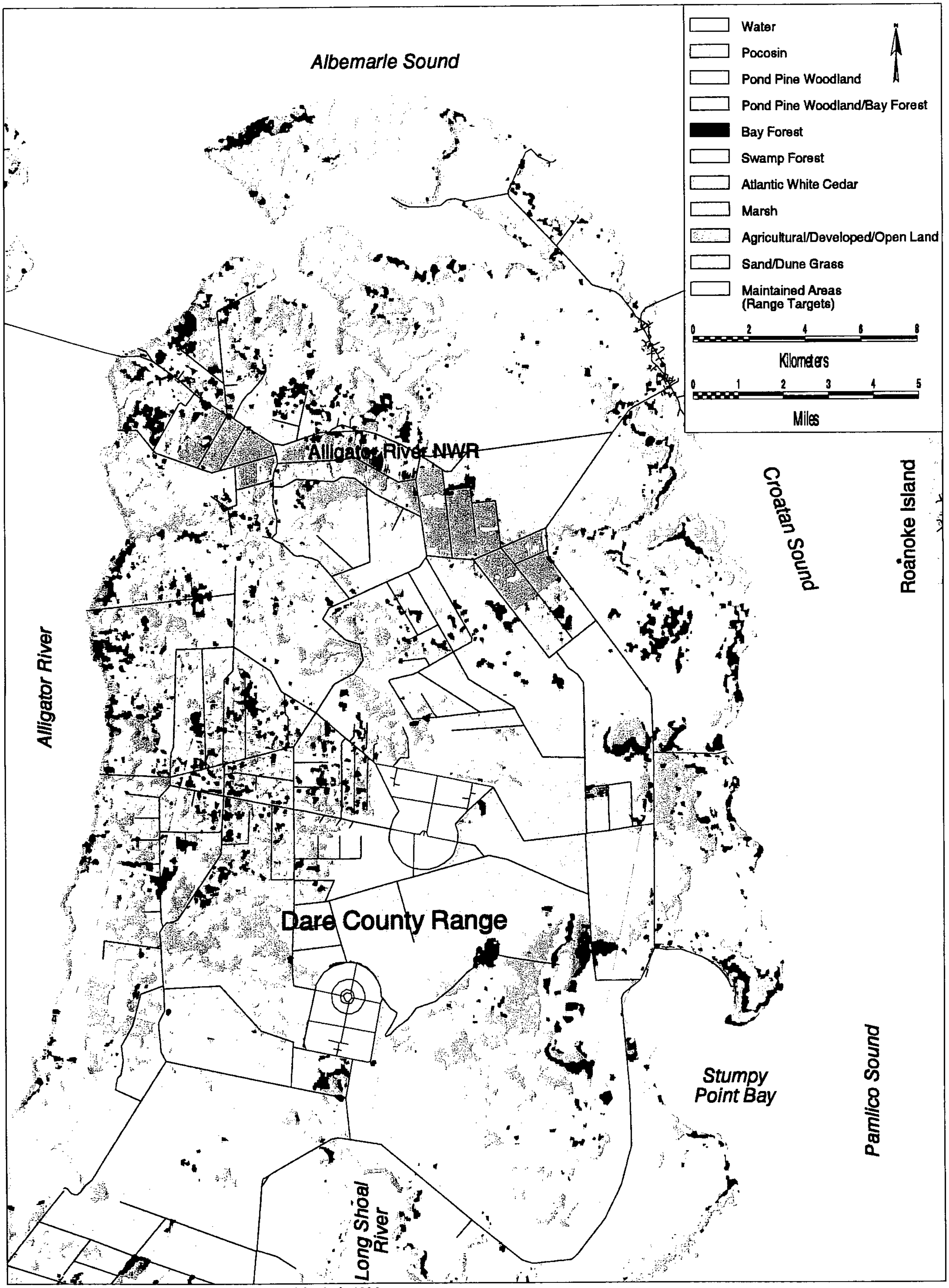
Vegetation. Vegetative cover at the Dare County Range reflects the underlying soils and represents species typically found in peatland communities. Peatland vegetation is adapted to the permanently saturated, nutrient-deficient, low-pH conditions present in these environments. Pocosin vegetation types, including low pocosin, high pocosin, and pond pine woodland, are characteristic of North Carolina peatlands. Other vegetative cover types around the periphery of peat areas, where organic soil layers are less thick, include bay forest, nonriverine swamp forest, and Atlantic white cedar forest (see Figure 3.1-11).

The pocosin vegetation communities at the Dare County Range include low pocosins, high pocosins, and pond pine woodlands. The low pocosins generally occur near the center of peatlands, where peat depths are greater than 3 feet. This is the most nutrient-deficient portion of the peatland, and the vegetation is usually stunted. Isolated, small pond pine (*Pinus serotina*) trees may be present in the low pocosin community, but the dominant vegetation type typically is shrubs, including loblolly bay (*Gordonia lasianthus*), inkberry (*Ilex galbra*), fetterbush (*Lyonia lucida*), titi (*Cyrilla racemiflora*), and honeycups (*Zenobia pulverulenta*) (USFWS 1986). Broadleaf evergreen shrub species typically are dominant at the range (Nature Conservancy 1995). The shrubs are often interwoven with vines of greenbrier (*Smilax spp.*). In addition, the low pocosin community at the Dare County Range supports an abundance of herbaceous vegetation, including the Virginia chainfern (*Woodwardia virginica*) and Walter's sedge (*Carex striata*).

High pocosin usually occurs in a band around areas of low pocosin. The peat is not as deep as in low pocosin areas. Plant species composition in these two community types is very similar, but in high pocosin areas the trees are more numerous and not as stunted and the shrub layer is typically higher and more dense. If fires are frequent, distinguishing between areas of high and low pocosins can be very difficult (Nature Conservancy 1995).

The pond pine woodland community also is dominated by pond pine and broadleaf evergreen shrub species. In the pond pine woodland community, however, pond pines can grow to 50 feet in height, and species such as swamp red bay (*Persea borbonia*) and loblolly bay can reach tree size (USFWS 1986). In addition, this community type may support dense stands of cane (*Arundinaria gigantea*) if exposed to regular fire (Nature Conservancy 1995).

Bay forest is usually associated with the outer edges of pond pine woodland, often between pond pine woodland and swamp forest (Nature Conservancy 1995). This cover-type, also called evergreen hardwood forest, has a tree canopy with an average height of



Source: NC Center for Geographic Information and Analysis 1996

Figure 3.1-11
Vegetative Cover - Dare County Range

approximately 25 feet dominated by red bay, loblolly bay, or sweet bay (*Magnolia virginiana*) (USFWS 1986). Because the overstory in bay forest provides significant shading year-round, the herbaceous and low shrubby vegetation is generally sparse. Bay forest is sometimes included among the pocosin habitats; however, the dominance of evergreen hardwoods distinguishes it from other pocosin types. Bay forest and pond pine woodland communities may be closely intermixed.

The swamp forest is a relatively uncommon component of peatlands and is usually associated with streams or the periphery of peatlands (Nature Conservancy 1995). The overstory in these forests is generally dominated by species such as swamp red bay, swamp blackgum (*Nyssa sylvatica biflora*), and red maple (*Acer rubrum*), which typically grow to a height of approximately 45 feet (USFWS 1986). A shrub understory of swamp red bay and fetterbush may be present, but the swamp forest typically has very little herbaceous vegetation. This community will maintain itself in the absence of fire, but some evidence indicates that frequent fires may provide an advantage for the development of an Atlantic white cedar (*Chamaecyparis thyoides*) forest in previously vegetated swamp forests (Nature Conservancy 1995).

Atlantic white cedar forests are typically even-aged stands in which Atlantic white cedar is dominant. In young and middle-aged stands, the subcanopy is poorly developed because of the high degree of shading caused by the canopy. In old stands, thinning of the canopy may allow development of a broadleaf understory consisting of fetterbush and red bay. This forest type requires a very specific fire regime; a fire must remove competing vegetation, but if it burns too deeply into the peat, the white cedars will be destroyed (Nature Conservancy 1995). Atlantic white cedar forests are absent from many peatlands because of the fire conditions needed and past logging activity.

Because peat bog environments are very susceptible to fire, fire-control services are administered at the Dare County Range by the Air Force. These services are contracted to the North Carolina Forestry Service under a fee-for-services agreement. Full-time oversight by fire crews is available during all periods of range operation. When the range is not scheduled for aircraft use, these crews maintain the roads and canals within the range.

Wildlife. The Dare County Range is a large tract of relatively undisturbed shrub and forested wetland surrounded on all sides by the Alligator River NWR. Therefore, the area provides habitat for many wildlife species that are shy or intolerant of human presence. In the target areas, the brush is cut. Although data on wildlife species using the habitats available on the range itself are unavailable, the U.S. Fish and Wildlife Service (USFWS) has

described wildlife species present at the nearby and ecologically similar Alligator River NWR (USFWS 1986).

The Alligator River NWR supports 145 species of resident and migratory birds (USFWS 1986). Many of these are migratory species, for which the area provides nesting and foraging habitat. Among the migratory species are raptors, including the merlin (*Falco columbarius*) and broad-winged hawk (*Buteo platypterus*); many types of shorebirds; warblers and other songbirds; and numerous species of waterfowl. Because of their habitat preferences, shorebirds and waterfowl would be concentrated in the shoreline areas of the Dare County peninsula and not within the range. Common breeding birds in the habitats of the Dare County Range include the prothonotary warbler (*Protonotaria citrea*) and black-throated green warblers, (*Dendroica virens*), pileated woodpecker (*Hylatomus pileatus*), red-cockaded woodpecker (*Picoides borealis*), red-bellied woodpecker (*Melenerpes carolinus*), wood duck (*Aix sponsa*), great egret (*Casmerodium albus*), great blue heron (*Ardea herodias*), nuthatches (*Sitta spp.*), and blue-gray gnatcatcher (*Polioptila caerulea*). Common wintering species include the American robin (*Turdus migratorious*), myrtle warbler (*Dendroica coronata*), and red-tailed hawk (*Buteo jamiacensis*).

The range supports an intermediate diversity of mammals, including species that require large tracts of land distant from human influence (USFWS 1986). Small mammals present throughout the area include the short-tailed shrew (*Blarina brevicauda*), marsh rabbit (*Sylvilagus palustris*), gray squirrel (*Sciurus carolinensis*), and long-tailed weasel (*Mustelafrenata*). Species such as the river otter (*Lutra canadensis*), muskrat (*Ondatra zibethyicus*), and mink (*Mustela vison*) make use of the streams and canals present in the area. White-tailed deer (*Odocoileus virginiana*) are common on the range. The bobcat (*Felis rufus*) is a common predator throughout the target range and feeds primarily on marsh rabbits. In addition, Dare County contains one of the largest populations of black bears (*Ursus americanus*) on the mid-Atlantic coast (USFWS 1986). The bears make use of cane stems, insects, blackgum mast, and berries for food.

Species of Concern and Significant Habitat Features. Both the USFWS and the North Carolina Natural Heritage Program (NHP) were contacted regarding the occurrence of listed species at the Dare County Range. The USFWS provided a list of federal species for Dare County (Zwicker 1996). The North Carolina NHP provided the results of a NHP database search for the range (Couvillion 1996). Table 3.1-15 lists the animal species of concern at the range.

USFWS identified six federally-listed bird species of concern in Dare County: endangered birds include the peregrine falcon *(Falco peregrinus)*, red-cockaded woodpecker,

Table 3.1-15

STATE- AND FEDERALLY-LISTED ANIMAL SPECIES OCCURRING AT THE DARE COUNTY RANGE DARE COUNTY, NORTH CAROLINA

Common Name	Scientific Name	Federal Status	State Status	Common Habitats
Bird Species				
Anhinga	*Anhinga anhinga*	–	SR	NSF, WCS
Black rail	*Laterallus jamaicensis*	C	SR	PC, BM
Red-cockaded woodpecker	*Picoides borealis*	E	E	PPW, PC, NSF, WCS
Mammal Species				
Red wolf	*Canis rufus*	EX	E	NSF, PPW, WCS, PC
Star-nosed mole	*Condylura cristata*	–	SC	NSF, WCS, PPW
Black bear	*Ursus americanus*	–	SR	PC, PPW, NSF, WCS
Reptile/Amphibian Species				
American alligator	*Alligator mississippiensis*	–	T	AQ
Invertebrate species				
Cane borer	*Acrapex relicta*	–	SR	PPW
Inchworm moth	*Anacamptodes NR cypressaria*	–	SR	NSF
Watson's arugisa	*Arugisa watsoni*	–	SR	NSF
Inchworm moth	*Cepphis decoloraria*	–	SR	NSF
Owlet moth	*Dysgonia similis*	–	SR	PPW
Sundew cutworm moth	*Hemipachnobia suborphyrea monochromatea*	–	SR	PPW, PC
Inchworm moth	*Hypagyrtis NR brendae*	–	SR	NSF
Louisiana owlet moth	*Macrochilo louisiana*	–	SR	PPW
Decorated Spur-throat grasshopper	*Melanoplus decorus*	–	SR	PC
Geometrid moth	*Metarranthis* sp.	–	SR	NSF
Hessel's Hairstreak	*Mitoura hesseli*	–	SR	NSF, WCS
Tussock moth	*Orgyia detrita*	–	SR	NSF, WCS, PPW
Aaron's skipper	*Poanes aaroni aaroni*	–	SR	NSF

Key at end of table.

Table 3.1-15 (Cont.)

Key:

Status

C = Federal candidate species.
E = Endangered.
EX = Extinct in wild (population is introduced).
SC = Species of concern.
SR = Significantly rare.
T = Threatened.

Habitats

AQ = Aquatic.
BM = Brackish marsh.
NSF = Nonriverine swamp forest.
PC = Low and high pocosin.
PPW = Pond pine woodland.
WCS = Atlantic white cedar swamp.

Source: Couvillion 1996.

and roseate tern *(Sterna dougalli dougalli)*; threatened species include the bald eagle *(Haliaeetus leucocephalus)* and piping plover *(Charadrius melodus)*; and one candidate bird, the black rail *(Laterallus jamaicensis)*. Of these species, the roseate tern, piping plover, and black rail are unlikely to occur at the Dare County Range. The piping plover and roseate tern are almost exclusively sandy beach/dune species, and no areas of sand beaches or dunes are present on the range (Fussell 1994).

Both the bald eagle and the peregrine falcon are transient visitors to the Alligator River NWR and may use the habitats on the range for foraging during migration (USFWS 1986). Neither bird is known to nest at the range. Although the black rail is primarily a salt and brackish marsh bird, it has been observed in the pocosin habitats of Dare County (Couvillion 1996). Nesting by black rails is likely to be limited to the brackish marshes around the shoreline of the Dare County peninsula; however, the pocosin habitats may be used for foraging and roosting.

The red-cockaded woodpecker is known to nest at the range. This bird is generally associated with southern pine stands, including longleaf pine (*Pinus palustris*), loblolly pine (*Pinus taeda*), shortleaf pine (*P. echinata*), slash pine (*P. elliotti*), and pond pine. The red-cockaded woodpecker population at the Dare County Range was studied by Geo-Marine, Inc. (1995). The majority of nesting cavities were located in relatively large pond pines in the pond pine woodland and high pocosin habitats. These areas also were used by this species for foraging, with insect larvae and other invertebrates comprising the primary prey. Consequently, the Dare County Range represents important breeding habitat for the red-cockaded woodpecker.

The anhinga (*Anhinga anhinga*), a state-listed significantly rare bird, is also known to occur at the Dare County Range. These birds are found near the various blackwater lakes and streams within the range and the Alligator River NWR, where they feed on fish and amphibians (Fussell 1994). Anhingas breed in Dare County, although the area is near the northern extent of their range.

An experimentally introduced population of the red wolf (*Canis rufus*) is the only federally-listed mammal species in Dare County (Zwicker 1996). This canine species was extinct in the wild in 1980 and was only saved by a captive breeding program based on 14 remaining purebred wolves. In 1987, four pairs of wolves were released in the Alligator River NWR, and by 1993 the population had grown to 40 or more individuals (Tripp 1996). This represents one of only two wild populations of the wolves in the United States (the other is in Great Smoky Mountains National Park). The red wolf typically lives in small family

groups, hunting deer, raccoons, and various small mammals and other animals (Tripp 1996). The wolves may be found in most habitats of the interior portions of Dare County.

The black bear is a state-listed significantly rare species that is common on the range. Bears utilize many of the habitat types at the range, particularly the various pocosin habitats (USFWS 1986).

All federally-listed reptile species in Dare County are sea turtles, which do not nest in the range and are not likely to enter the small creeks or rivers within the range (Zwicker 1996). The state-threatened American alligator (*Alligator mississippiensis*) occurs in many of the marshes and slow-moving canals and creeks in the Alligator River NWR (USFWS 1986). Dare County is near the northern extent of the alligator's range. Alligators prefer sluggish, fresh water to slightly brackish streams, where they feed on a variety of animals ranging from small invertebrates to medium-sized mammals (LeBlond et al. 1994). They build nests consisting of a mound of mixed vegetation and soil on land in swamps or marshes. Poaching and nest predation represent significant threats to the population. No federally-listed amphibian species occur in Dare County.

Several rare insect species also have been observed at the Dare County Range, including several moth species. None of these insects is federally-listed, although most are state-listed significantly rare species.

Two federally-listed plant species occur in Dare County, the threatened sea beach amaranth (*Amaranthus pumilus*) and the candidate dune blue curls (*Trichostema sp.*). Both species inhabit areas of dry, sandy uplands and dunes; therefore, they are not expected to occur at the Dare County Range, which lacks these habitat types.

Several state-listed plants are found in Dare County, three of which have been observed at the Dare County Range: cranberry (*Vaccinium macrocarpon*), a candidate species; spoonflower (*Peltandra sagittifolia*), a significantly rare species; and northern white beaksedge (*Rhynchospora alba*), a candidate species. These species are bog plants and, thus, are adapted to grow in nutrient-poor, saturated soils (Radford et al. 1968). The cranberry is found in low, and possibly high, pocosin habitats. Spoonflower and white beaksedge are also found in pocosin habitats, and they have been observed in nonriverine swamp forest and Atlantic white cedar forest.

According to the North Carolina NHP, nine significant natural areas have been identified within the Air Force portion of the Dare County Range, five of which are of national significance: the Alligator River Swamp Forest, the Faircloth Road Pond Pine Pocosin, the U.S. 264 Low Pocosin, the Taylor Road Natural Area, and the Alligator River Refuge/Swan Creek Lake Swamp Forest. Regionally significant natural areas include the

Alligator River Refuge (central section and southeast marshes), and the Long Shoal River Marshes and Pocosins. The Pine Road Swamp is a natural area of state significance.

Three of the nationally significant natural areas identified within the Dare County Range—the Alligator River Swamp Forest, the Faircloth Road Pond Pine Pocosin, and the U.S. 264 Low Pocosin—comprise approximately two-thirds of the southern portion of the range. Identification of these natural areas led to the 1984 Cooperative Agreement between the Air Force and the State of North Carolina, in which the Air Force agreed to register these natural areas and to restrict certain areas from timber harvest (Nature Conservancy 1995).

The Alligator River Swamp Forest, located along the Alligator River and tributary streams in the southwestern portion of the Dare County peninsula, is one of the highest quality nonalluvial swamp forests remaining in North Carolina (Couvillion 1996). Portions of the area are dominated by Atlantic white cedar swamp and other portions are dominated by bald cypress (*Taxodium distichum*) and swamp black gum.

The Faircloth Road Pond Pine Pocosin and the U.S. 264 Low Pocosin are located along U.S. Route 264 between Stumpy Point Fire Tower and the Dare/Hyde County line. The Faircloth Road Pond Pine Pocosin is among the best remaining examples of the once common pond pine woodland vegetation type. The area has a pond pine canopy 50 to 70 feet in height and a dense cane layer. This habitat supports a known colony of red-cockaded woodpeckers and several rare moth species (Couvillion 1996). The U.S. 264 Low Pocosin, also a rare vegetation type, is unique in that it is estimated to have been covered by pocosin vegetation for more than 3,000 years. The U.S. 264 Low Pocosin contains known populations of cranberry, northern white beaksedge, and spoonflower (Couvillion 1996).

The Alligator River NWR is a nationally significant megasite containing three smaller significant sites: Swan Creek Lake Swamp Forest, the central section, and the southeast marshes. The Swan Creek Lake Swamp Forest is contiguous to the Alligator River Swamp Forest and contains similar habitat, as well as a blackwater lake (Swan Creek Lake). The Nature Conservancy obtained 6,000 acres (2,428 hectares) of this area (but without rights to the white cedar timber) in 1985 (Couvillion 1996). The central section of the refuge is on the north-central portion of the peninsula, between the Dare County Range and U.S. Route 64. This section contains extensive areas of nonriverine swamp forest, Atlantic white cedar swamp, and pond pine woodland, as well as several small lakes. The southeast marshes, located on the east and south sides of U.S. 264 on the shores of Pamlico Sound, consist of extensive brackish marsh grading inland to pond pine woodland. In addition, the area contains a gull/tern/skimmer nesting colony, a significant habitat feature.

The Pine Road Swamp and Taylor Road Natural Area are located in the vicinity of the Faircloth Road Pond Pine Pocosin and consist of similar habitat types. The Long Shoal River Marshes and Pocosins is a large strip of shore located on the Pamlico Sound coast of Hyde County. The Dare County Range is approximately 2 miles (3 km) north of the site (Couvillion 1996). Although this area is rather poorly studied, it contains areas of brackish marsh, estuarine fringe loblolly pine forest, pond pine woodland, and low and high pocosins.

Air Quality

Aircraft emissions associated with operations conducted below 3,000 feet AGL at the Dare County Range were determined using the same procedure as for BT-9 and BT-11. A slightly different aircraft model population operates at this range (ATAC 1997). Aircraft engine fuel usage and emission factors appropriate for these aircraft engines were used.

Existing emissions from target operations in Dare County are presented in Table 3.1-16. Emissions of VOCs, NOx, CO, SO_2, and PM_{10} are each below 1 ton per year.

3.1.4 NAS Oceana and NALF Fentress Land Use

3.1.4.1 Existing Land Use

Existing land use at NAS Oceana is shown in Figure 3.1-12. Primary land uses involve flight operations (runways and taxiways), aircraft maintenance and support facilities, training and administrative uses, and housing, community support, and recreational uses.

The flight line tends to define and influence other land uses at the station. Maintenance and operational support uses (e.g., hangars, engine maintenance fueling facilities) are located adjacent to the flight line to provide easy access by aircraft. Training and administrative facilities are located adjacent to operational and support facilities.

Bachelor quarters and various community support activities (e.g., dining, banking, chapel) are generally located in the central and southeast part of the station; family housing areas are located on the periphery. The station also contains several developed recreational facilities including a 27-hole golf course, ball fields, and swimming facilities.

Existing land use at NALF Fentress consists of air operations and operationally constrained areas such as airfield clear zones and ordnance storage areas. Air operation facilities include a northeast-southwest runway, a control tower, fire and rescue station, and a few small administrative buildings.

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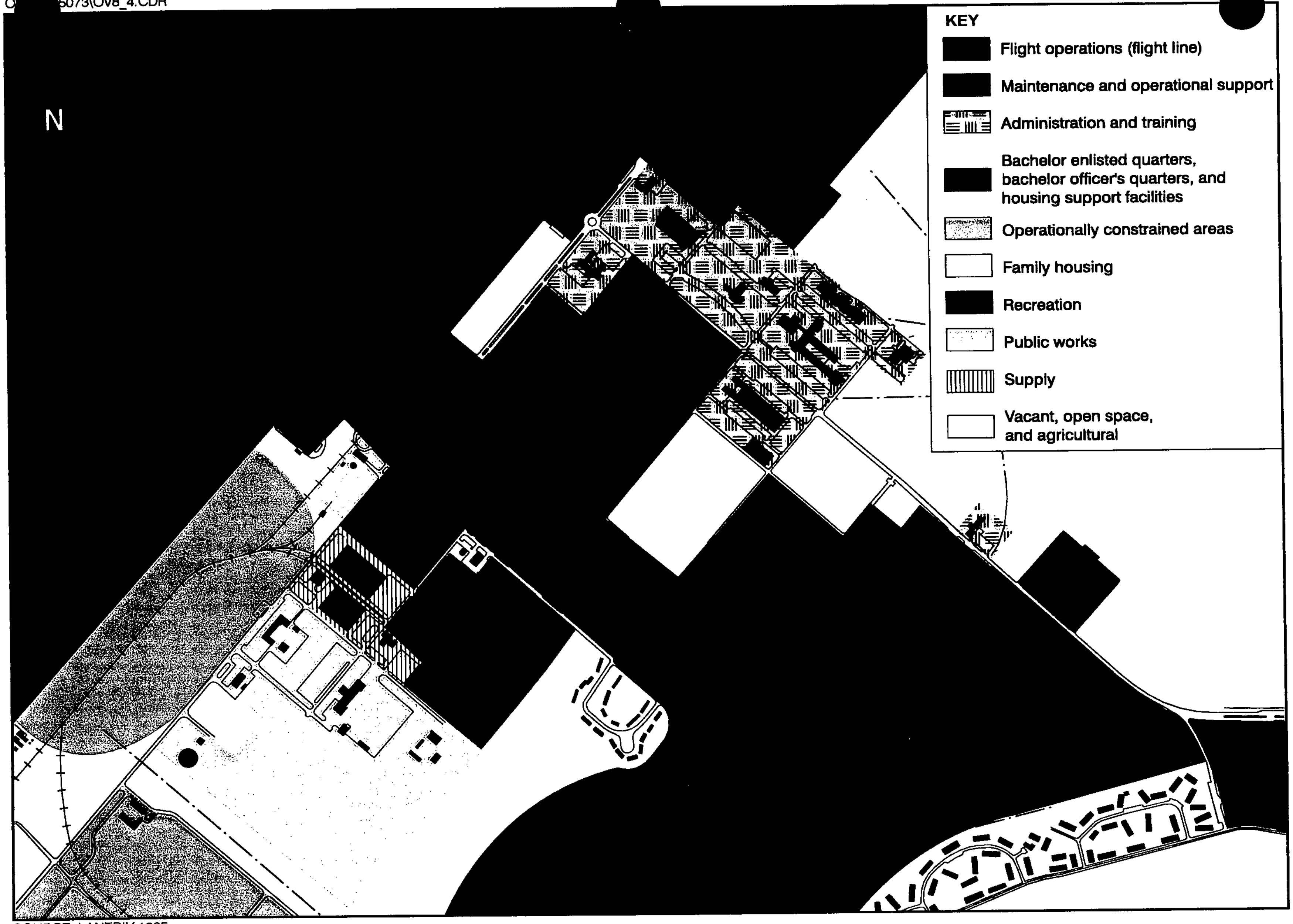

SOURCE: LANTDIV 1985.

Figure 3.1-12 EXISTING LAND USE - DEVELOPED AREA OF NAS OCEANA

Table 3.1-16

EXISTING EMISSIONS AT DARE COUNTY RANGE

Aircraft Type	Annual Operations Below 3,000 ft.[a]	VOC (tons/yr)	NO_x (tons/yr)	CO (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)
F-14B/D	244	0.0168	0.3998	0.0479	0.0107	0.0921
F/A-18	5	0.0013	0.0062	0.0032	0.0001	0.0015
AV-8	74	0.0056	0.0416	0.0403	0.0020	0.0000
EA-6B	4	0.0010	0.0012	0.0019	0.0001	0.0000
A-10[b]	14	0.0010	0.0022	0.0069	0.0002	0.0010
F-16	52	0.0006	0.0619	0.0064	0.0009	0.0012
F-15	10	0.0001	0.0113	0.0012	0.0002	0.0002
T-34	0	0.0000	0.0000	0.0000	0.0000	0.0000
Total[c]	**403**	**0.0261**	**0.5243**	**0.1077**	**0.0142**	**0.0961**

a Percentage of annual operations below 3,000 ft. obtained from NAVAIRLANT except as noted below.
b Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
c Figures may not total due to rounding.

Key:

CO = Carbon monoxide.
NO_x = Nitrogen oxides.
PM_{10} = Particulate matter.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compounds.

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Land uses adjacent to NAS Oceana and NALF Fentress are shown in Figure 3.1-13. In general, the majority of existing development occurs north and east of the station, with less developed areas south of the station and around NALF Fentress.

Existing development surrounding the station includes a variety of residential, commercial, industrial, and agricultural uses, including:

- Areas north of the station consist of medium-density residential development extending east/west along the station's property boundary. North of these residential areas are a mix of commercial, residential, and business uses along major road corridors such as Virginia Beach Boulevard, Laskin Road, First Colonial Road, and Great Neck Road.

- Areas immediately west of the station are predominantly agricultural and industrial; however, a large residential area containing over 200 residences abuts the station to the northwest. West of these areas, along Lynnhaven Parkway, land uses include the Lynnhaven Shopping Mall, a large single- and multi-family residential development, and industrial parks.

- Areas directly east and southeast of the station include largely undeveloped forested land. The relatively undeveloped area is characterized by a mixture of scattered single-family residential, agricultural, and industrial activities. Areas northeast of the station are primarily single-family and multi-family residential developments adjacent to Virginia Beach waterfront.

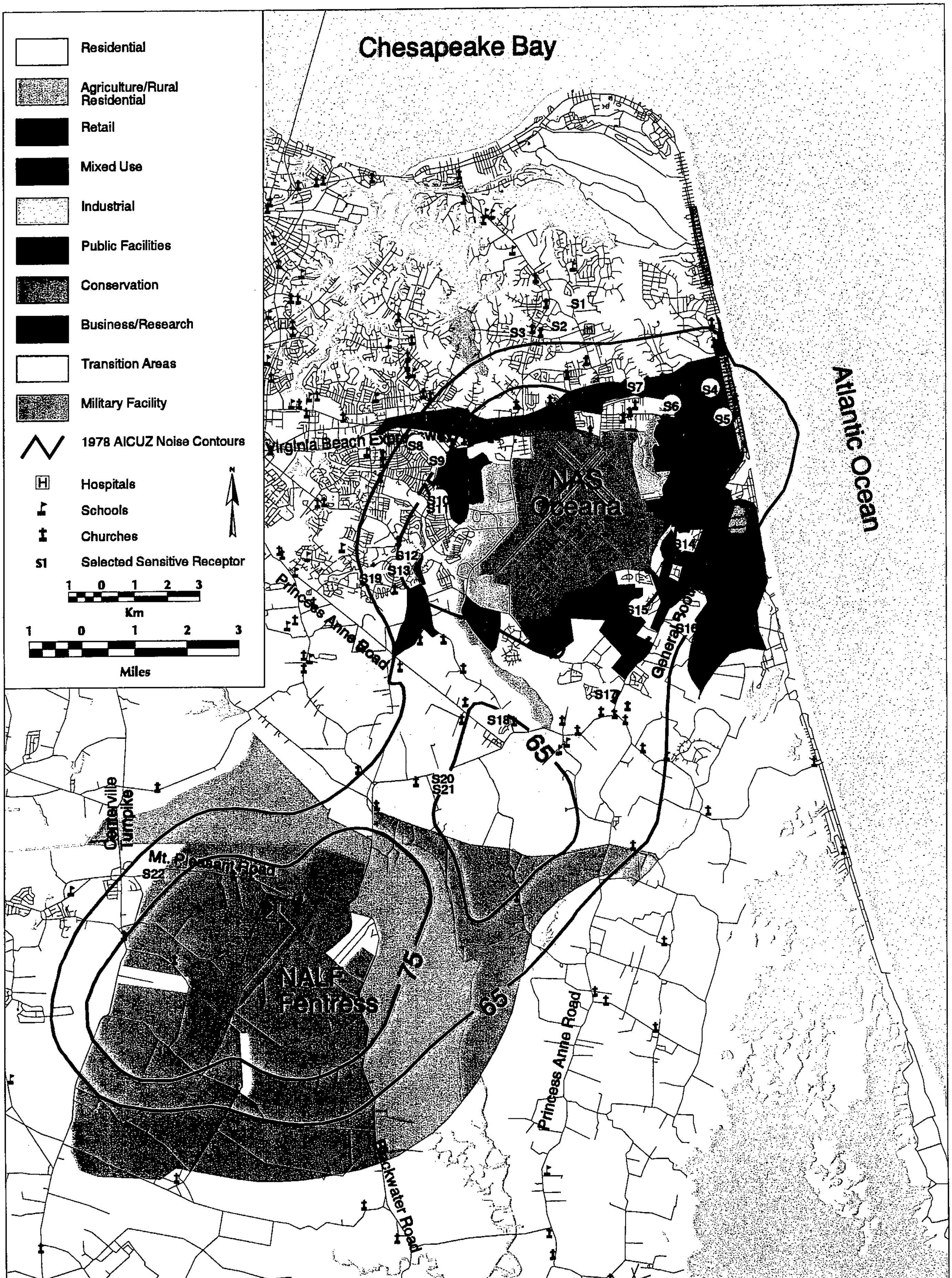
- Areas south of the station are less developed. Land uses include primarily agricultural activities; however, there are limited areas of industrial and residential uses.

Areas between the station and NALF Fentress are generally less developed and are described as "Transitional Areas" under the Virginia Beach Comprehensive Plan. These areas will allow for various types of future residential, recreational, and industrial development at densities compatible with environmentally sensitive land (City of Virginia Beach 1991).

Land use immediately surrounding NALF Fentress includes primarily agricultural activities and low-density residential development. Limited areas of commercial and industrial activities occur where appropriate infrastructure is available (Howlett 1995).

3.1.4.2 Plans and Policies

Development within and around NAS Oceana and NALF Fentress is guided or influenced by the following plans and policies:



Source: City of VA Beach 1991
City of Chesapeake 1993
U.S. Navy 1978

Figure 3.1-13
Regional Future Land Use and Existing AICUZ Noise Contours

- Master Jet Base Master Plan, NAS Oceana;
- Air Installations Compatible Use Zones (AICUZ) Program;
- Virginia Beach and Chesapeake comprehensive plans;
- Virginia Beach and Chesapeake zoning ordinances;
- The Coastal Zone Management Program; and
- Integrated Natural Resources Management Plan.

Master Jet Base Master Plan

The station master plan sets forth broad development policies for NAS Oceana to provide planning guidance. The plan encompasses several background studies regarding development constraints, regional development, operational requirements, and capital improvements. The future development plan indicates a general continuation of current functional land use arrangements at the station, with minor extensions into relatively undeveloped areas (LANTDIV 1985).

AICUZ Program

When Congress enacted the Noise Control Act of 1972, it exempted military aircraft. However, in the spirit of the Act, DoD established the AICUZ program in 1973. By working with local governments, the AICUZ program fosters compatible development around military airfields to protect the health, safety, and welfare of those living in nearby communities while enabling DoD to safely conduct its flight operations. The program defines areas around the station that are exposed to increased levels of aircraft noise and the potential for aircraft accidents. The AICUZ study includes a detailed analysis of aircraft noise, accident potential, land use compatibility, operational procedures, and recommendations for compatible development in the vicinity of the installation.

Aircraft noise impacts are quantified and depicted through noise exposure contours, which are developed by computer modeling of aircraft operations at the installation. These contours reflect installation-specific operation data such as flight tracks, type and mix of aircraft, frequency/times of operations, altitude profiles, and aircraft performance parameters (power and airspeed). Noise exposure contours, measured in day-night average sound level (Ldn), are developed using either annual average day (AAD) or average busy day (ABD) operations where appropriate (see Section 3.1.8). The Ldn noise metric places more weight

on measurements for night operations (10:00 p.m. to 7:00 a.m.) because of the higher annoyance associated with night operations when ambient noise levels are low (see Appendix H).

Noise exposure areas are divided into three noise zones. Noise Zone 1 (less than 65 Ldn) is essentially an area of minimal noise impact. Noise Zone 2 (65-75 Ldn) is an area of moderate noise impact. Noise Zone 3 (greater than 75 Ldn) is the area most severely impacted by noise (U.S. Navy 1988). When aircraft operations or aircraft type change, a new aircraft noise study is typically performed to accurately assess the potential change in noise exposure.

Unique to military airfields is the concept of accident potential zones (APZs). As early as 1952, the federal government recognized the threat by urban encroachment to military airfields and, conversely, the impact of air operations on surrounding communities. "The Airport and its Neighbors, the Report of the President's Airport Commission," more commonly known as the Doolittle report, recommended that an area surrounding the airfield be set aside as a buffer for aircraft accidents. The "Doolittle" report recommended the ends of each runway be kept clear and free of obstacles. Now referred to as clear zones, these zones represented the first step by DoD toward controlling land use near air installations. Originally aimed toward protecting pilots and their aircraft from obstructions and hazards on the ground, this safety concept evolved over the years to include an equal concern for the safety of those people living near the installations (see Appendix G).

The concept of APZs, rooted in the Doolittle report in the 1950s, led to the establishment of the first APZ guidelines after a 1972 tri-service investigation of accidents. This investigation showed that on airfields with normal approaches and departures, the greatest distribution of accidents occurred near the airfield along the extended runway centerline. The distribution also decreased with distance from the end of the runway. Follow-up studies by the Air Force and the Navy reaffirmed this concept. The APZ concept, based on the initial tri-service investigation and follow-on studies, clearly indicates a pattern of accident locations on or near the runways at military airfields. The data suggest that the areas defined by the APZs are more likely to experience an aircraft accident than other areas within a 5-mile radius of the airfield. While APZs indicate probable accident locations, they do not imply that it is unsafe to live and work in the vicinity of military airfields. Safety is a relative measure, particularly given the number of aircraft accidents (632 accidents) that have occurred at Navy and Marine Corps airfields since APZs were identified in the early 1970s. To protect the operational capability of military airfields, the DoD works with local communities to promote future land use development in the vicinity of military airfields.

The APZ is not a prediction of accidents. Rather, APZs define those areas near military airports where an accident is most likely to occur and not the probability of an accident. Nearly 80% of accidents recorded in a 13-year study occurred on or near the runway or within the APZs (U.S. Navy 1981). An overview of accident histories is presented in Appendix G.

Generally, three defined zones extend from the end of the runway along the extended centerline:

- The clear zone, extending 3,000 feet from the runway threshold;
- APZ 1, extending 5,000 feet beyond the clear zone; and
- APZ 2 extending 7,000 feet beyond APZ 1.

Based on the study, the highest potential for accidents is within or adjacent to the runway (56%), followed by the clear zone (12%) (U.S. Navy 1981). The potential for accidents decreases with distance. Approximately 7% of reported accidents occurred in APZ 1, and less than 3% occurred in APZ 2 (U.S. Navy 1981). Site-specific conditions may influence the APZ geometry. These conditions include, but are not limited to:

- Local accident history;
- Type of aircraft operations;
- Airspace restrictions as they affect flight operations; and
- Weather and other environmental conditions (e.g., bird strike hazards).

Noise zones and APZs are displayed on the AICUZ map. Land use recommendations are provided for noise zones and APZs. These recommendations discourage noise-sensitive uses in high noise zones (e.g., residential, amphitheaters, schools) and people-intensive uses in APZs (e.g., high density residential development, public assembly events, regional shopping malls). The land use compatibility guidelines are provided to local governments for consideration in their comprehensive land use planning and zoning process (see Appendix G).

Since DoD does not have any regulatory land use authority outside the installation, the AICUZ recommendations are not binding on local communities. Rather, they are recommendations intended to facilitate compatible development near military airports.

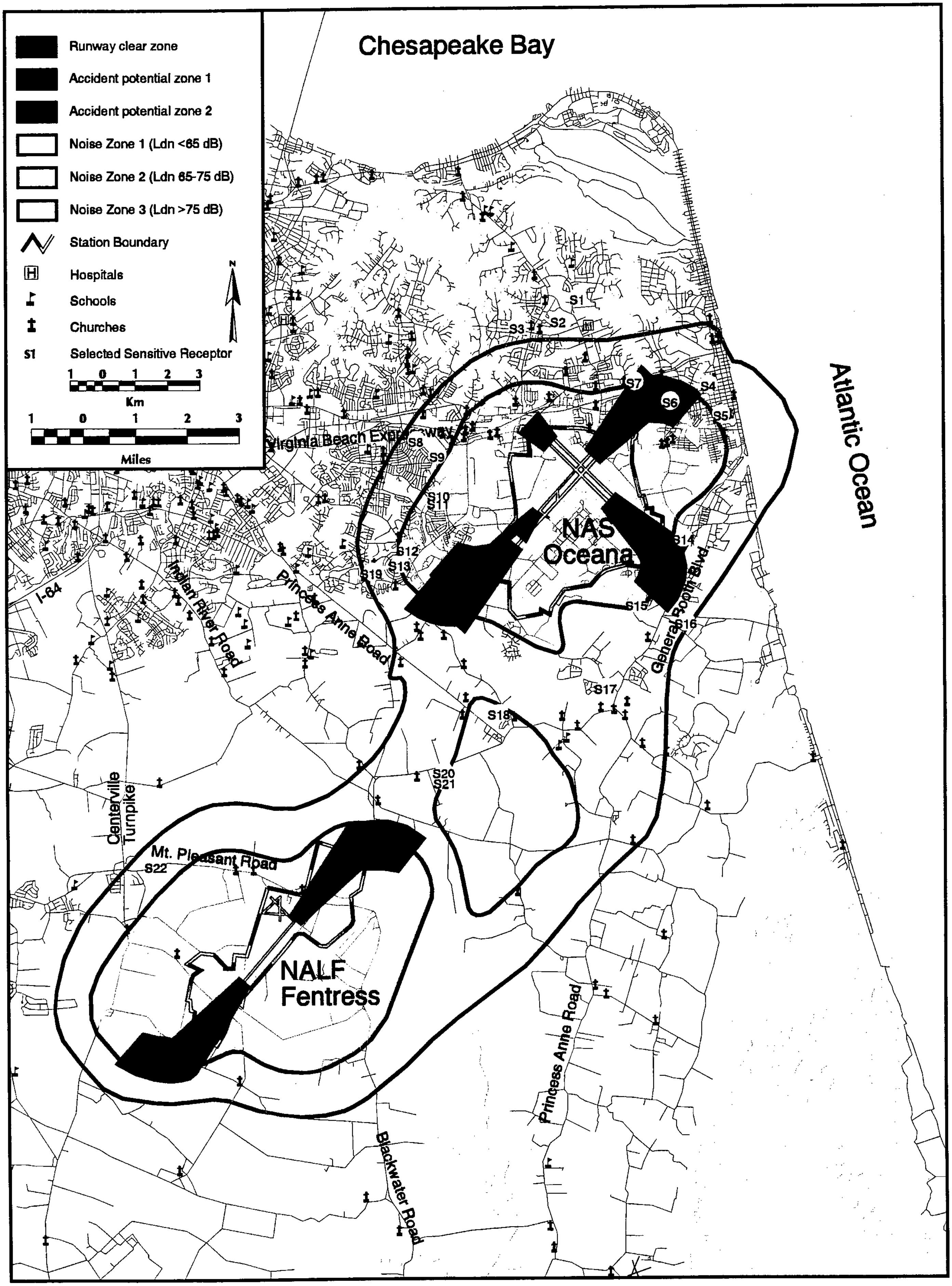
Under the AICUZ program, land acquisition can be considered to avert encroachment on Naval air stations by the surrounding community. The primary purpose of land acquisition

is to protect the operational integrity of the air station from incompatible land use development. When operational integrity is threatened by incompatible development (encroachment), and local community governing bodies are unwilling or unable to curtail the threat via their own authority (i.e., zoning), the Navy can give consideration to land acquisition or easement purchase. If the mission of the air installation is imminently threatened, it may be appropriate to purchase land and/or restrictive easements over impacted lands in any noise or accident potential zone. The first priority for acquisition is the clear zone; the second priority is given to other APZs. Acquisition of property or easements within noise zones may be considered only when the operational integrity of the air station is manifestly threatened and all other avenues of achieving compatible use zoning, or similar protection, have been explored.

The AICUZ boundaries (noise contours and APZs) around NAS Oceana and NALF Fentress were first established by the Navy in 1978 (see Figure 3.1-14). Since that time, the Navy has developed new criteria for determining APZs. To reflect these changes in the APZ methodology, APZs for NAS Oceana and NALF Fentress were updated in 1997 based on current airfield operations. Figure 3.1-15 presents the updated 1997 APZs. Figures 3.1-16 and 3.1-17 compare the 1978 AICUZ and the updated 1997 APZs for NAS Oceana and NALF Fentress, respectively. A comparison of the 1978 AICUZ noise contours and the 1997 noise contours is included in Section 3.1.8.

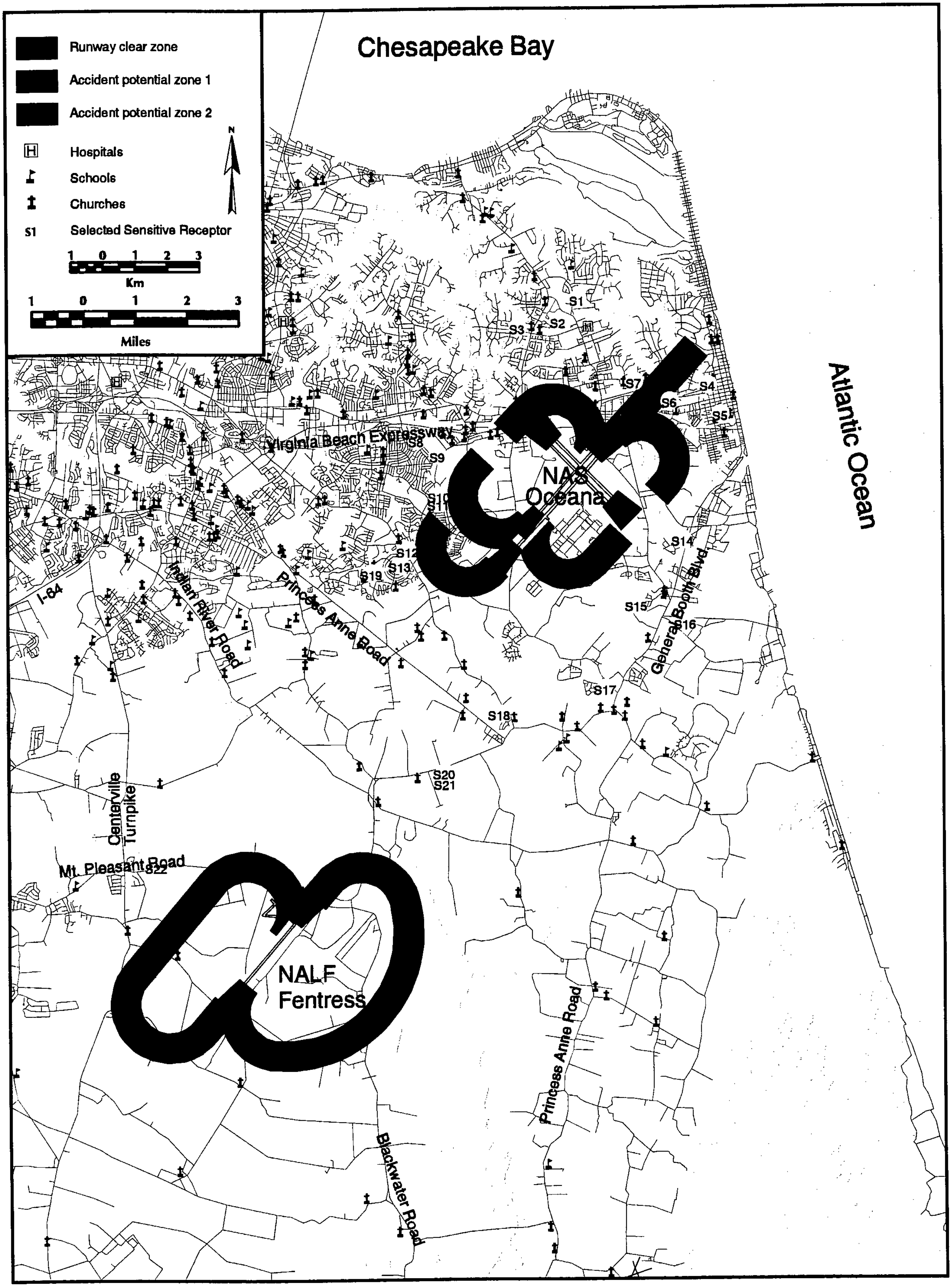
The 1978 AICUZ has been recognized by the cities of Virginia Beach and Chesapeake in their comprehensive plans and was recently incorporated into their respective zoning ordinances. Since its original publication in 1978, the AICUZ footprint has been used by local governments and real estate groups to identify noise and safety impacts in the vicinity of NAS Oceana and NALF Fentress. Existing 1997 noise contours and APZs have been provided; however, in 1997, NAS Oceana operations were at their lowest level in 20 years, primarily due to the disestablishment of the A-6 community. Because the 1978 AICUZ is more representative of NAS Oceana operations in the past 20 years and has been adopted into local zoning ordinances, the 1978 AICUZ has been used as a baseline for comparative analyses with each ARS.

Table 3.1-17 corresponds to Figure 3.1-16 and presents the acreage by land use type within the 1978 and 1997 clear zones and APZs for NAS Oceana. Similarly, Table 3.1-18 presents the acreage for land use type in the 1978 and 1997 clear zones and APZs for NALF Fentress. For the 1978 APZ, the clear zone predominately overlays the military facility. APZ 1 covers various land uses including residential, primarily to the north of the station; industrial; and the military facility. Residential land use also predominates under APZ 2; other land uses include the military facility and other public facilities, mixed use, and



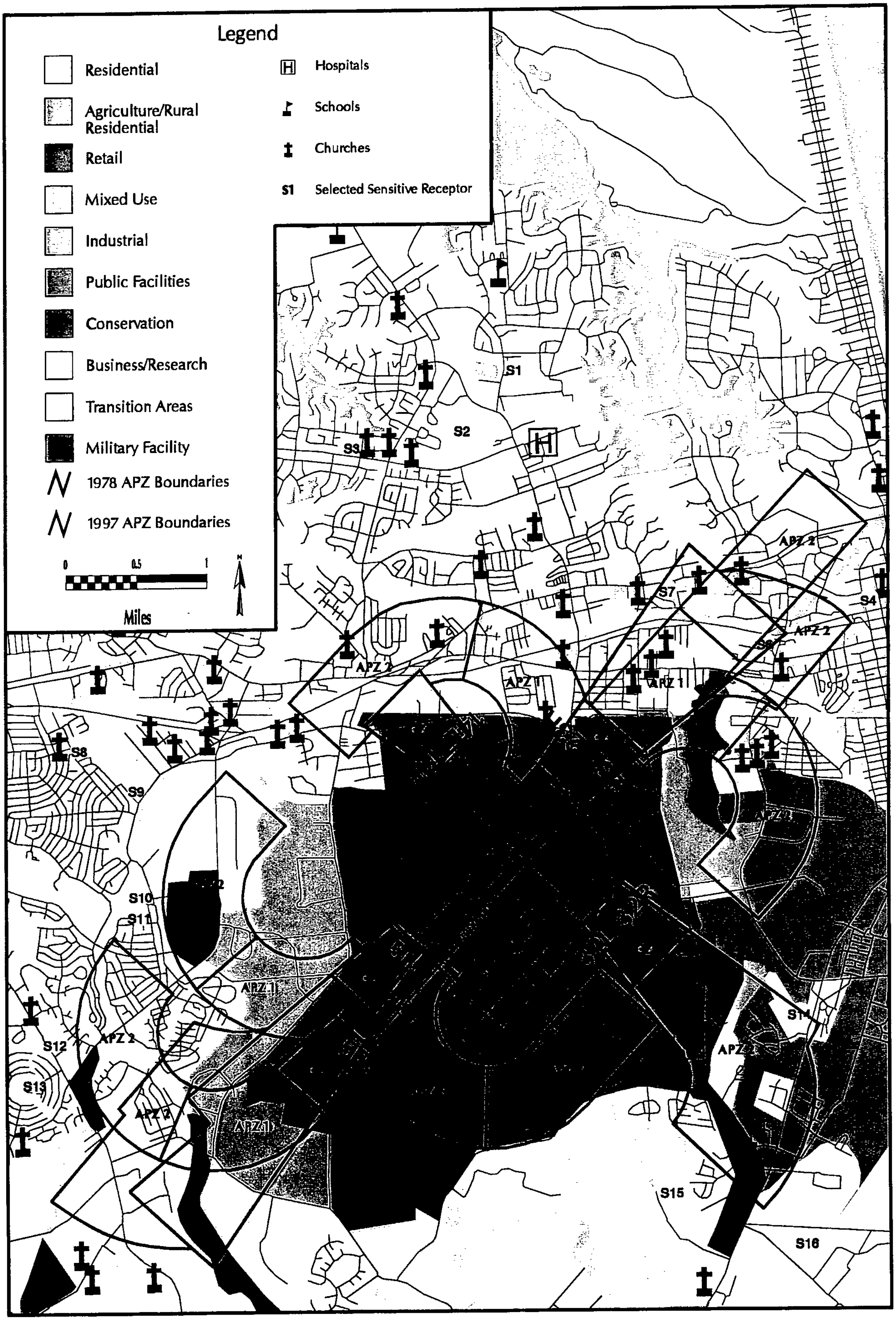
Source: U.S. Navy 1978

Figure 3.1-14
1978 AICUZ Boundaries
NAS Oceana



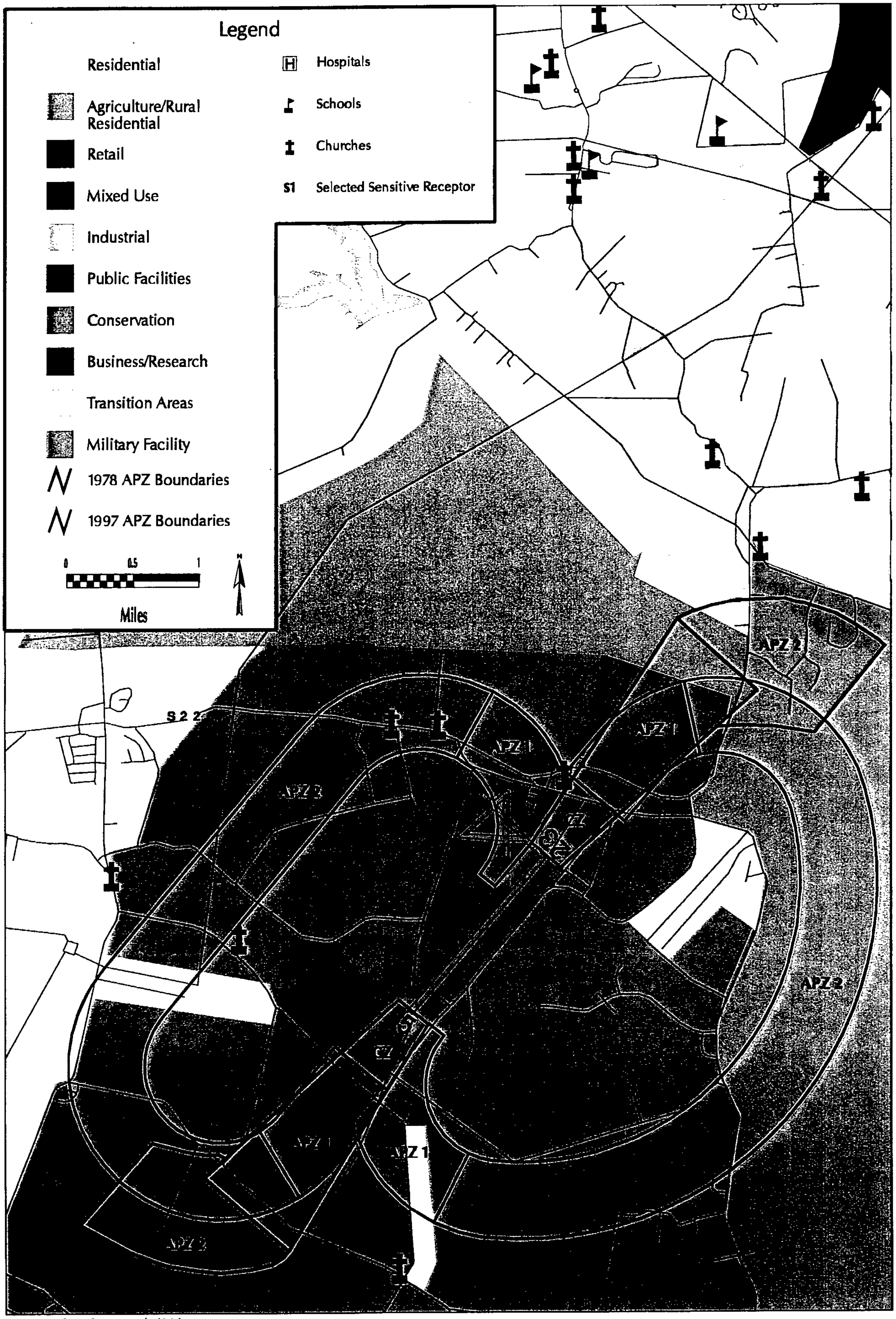
Source: Wyle Labs 1997

Figure 3.1-15
1997 APZs
NAS Oceana



Source: City of VA Beach 1991
U.S. Navy 1978;Wyle Labs 1997

Figure 3.1-16
1978/1997 APZs and Land Use
NAS Oceana



Source: City of VA Beach 1991
City of Chesapeake 1993
U.S. Navy 1978;Wyle Labs 1997

Figure 3.1-17
1978/1997 APZs and Land Use
NALF Fentress

Table 3.1-17

EXISTING LAND USE WITHIN 1978 AND 1997 APZs AT NAS OCEANA

APZ	Land Use	1978		1997	
		Acres	Hectares	Acres	Hectares
Clear Zone	Military Facility	578	234	684	278
	Mixed Use	42	17	81	33
	Residential	13	6	19	8
	Industrial	0	0	1	<1
APZ 1	Residential	418	169	459	186
	Industrial	289	117	438	177
	Military Facility	268	107	630	254
	Mixed Use	135	55	233	94
	Conservation	87	36	118	48
	Business/Research	79	32	4	2
	Public Facility	30	12	38	15
APZ 2	Residential	673	272	940	381
	Military Facility	430	174	474	192
	Mixed Use	285	115	648	262
	Public Facility	175	71	269	109
	Industrial	142	58	150	60
	Business/Research	89	36	243	98
	Retail	84	34	156	63
	Conservation	25	11	4	2
TOTAL		3,842	1,556	5,589	2,258

Table 3.1-18

EXISTING LAND USE
WITHIN 1978 AND 1997 APZs AT NALF FENTRESS

APZ	Land Use	1978		1997	
		Acres	Hectares	Acres	Hectares
Clear Zone	Military Facility	214	87	254	103
	Agriculture/Rural Residential	0	0	7	3
APZ 1	Agriculture/Rural Residential	306	124	585	236
	Military Facility	631	256	758	307
	Residential	0	0	66	27
	Conservation	116	47	0	0
APZ 2	Conservation	492	199	1,346	545
	Agriculture/Rural Residential	565	228	2,810	1,137
	Transition Areas	29	12	0	0
	Residential	0	0	163	66
	Military Facility	0	0	80	32
	TOTAL	2,353	953	6,069	2,456

industrial. For the 1997 APZ, the military facility is the predominant land use underlying the clear zone and APZ 1. APZ 1 also covers a large area of residential, industrial, and mixed land uses. APZ 2 covers various land uses including residential, mixed use, and the military facility and other public facilities.

Two school facilities, Seatack Elementary and Linkhorn Elementary, are located within the 1978 APZ 1, north of the station; however, these schools are not located within the 1997 APZ 1. These schools are also located within the 1978 Noise Zone 3 (i.e., Ldn > 75 dB); however, they are located in the 1997 Noise Zone 1 (i.e., Ldn < 65 dB). The Navy and the city have coordinated plans to relocate these schools because school facilities are not compatible with Noise Zone 3. A new school building for Linkhorn Elementary is currently under construction.

As shown on Figure 3.1-17, both the existing APZs (1978) and the 1997 updated APZs for NALF Fentress overlie various types of land uses. Acreages for each type of land use underlying the 1978 and 1997 APZs are provided in Table 3.1-18. The clear zones in both the 1978 and 1997 APZs are contained entirely within NALF Fentress. APZ 1 and APZ 2 both in the 1978 and 1997 APZ overlie NALF Fentress and extend beyond the boundary of the property over agricultural and conservation lands.

In the mid-1970s, the Navy initiated a long-term AICUZ land acquisition program to acquire by purchase certain restrictive-use easements over lands within the AICUZ footprint at NAS Oceana and NALF Fentress. From 1976 to 1986, eight projects were undertaken to acquire interests on lands surrounding the station and NALF Fentress to limit incompatible development (see Figure 3.1-18). The Navy acquired rights to 4,196 acres (1,698 hectares) of real estate surrounding NAS Oceana and 8,780 acres (3,553 hectares) surrounding NALF Fentress (LANTDIV 1988b). Of the rights acquired, 96% were in the form of restrictive easements; the remaining 4% were purchased in fee by the Navy.

Comprehensive Plans

In accordance with the Virginia Planning Law, the cities of Virginia Beach and Chesapeake have adopted comprehensive plans that provide overall guidance to the physical development of their cities and set forth the basis for subsequent land development regulations (zoning, subdivision, environmental) and public development programs (i.e., capital improvements). The plans recognize the AICUZ concepts for NAS Oceana and NALF Fentress and accordingly recommend compatible land uses (City of Virginia Beach 1991; City of Chesapeake 1990).

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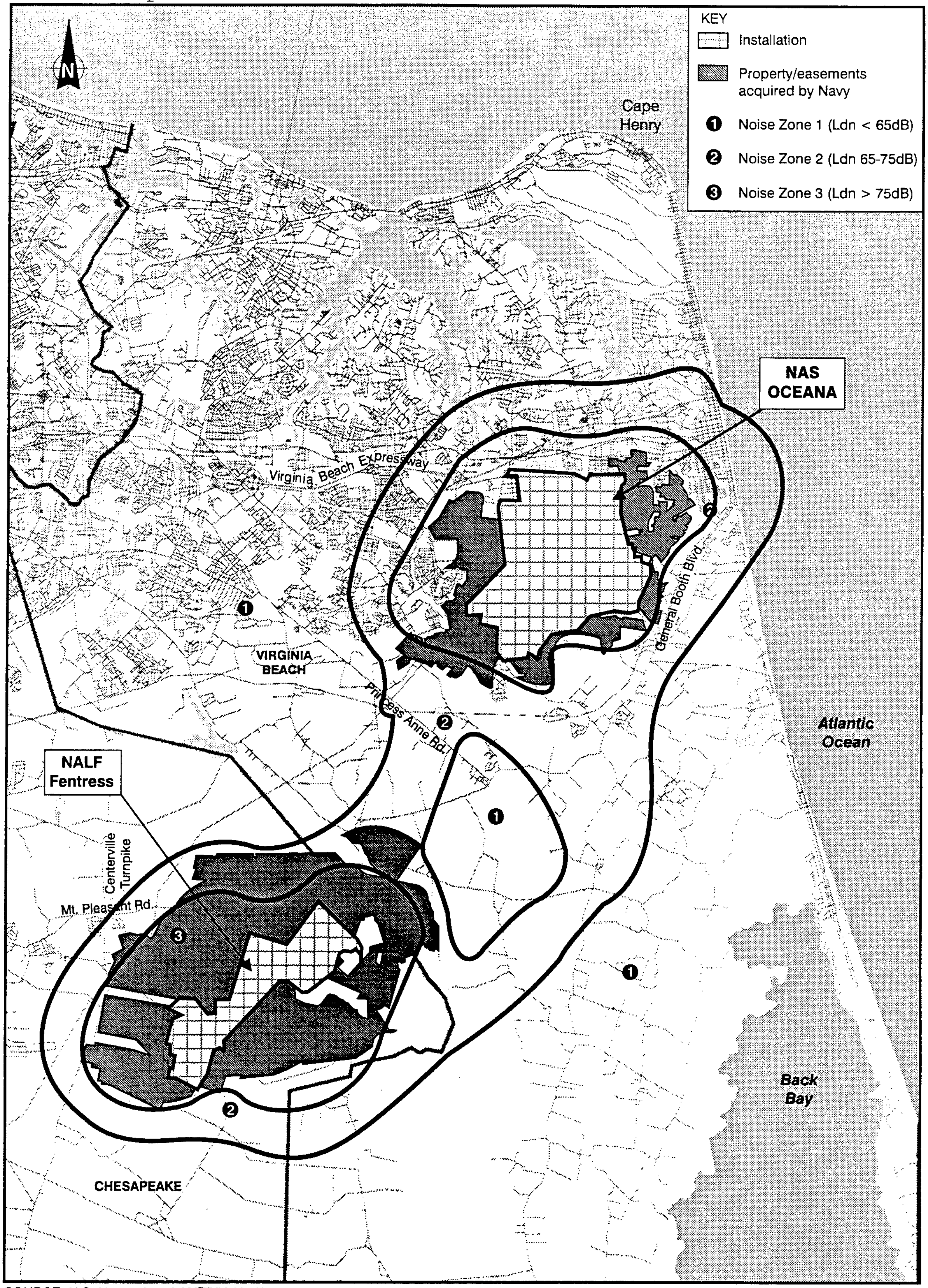

SOURCE: U.S. Navy 1978; LANTDIV 1988b.

APPROXIMATE SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 3.1-18 AICUZ ACQUISITIONS - NAS OCEANA

Zoning Ordinances

The cities of Virginia Beach and Chesapeake Zoning Ordinances set forth specific regulations regarding the development of lands within the cities. As a federal facility, NAS Oceana and NALF Fentress are exempt from municipal zoning regulation.

As a decision-making tool, the NAS Oceana 1978 AICUZ policies have been adopted by the cities of Chesapeake and Virginia Beach to incorporate AICUZ noise zones in their respective zoning ordinances. As such, both municipalities have implemented measures that control new development deemed incompatible with the AICUZ program. The City of Virginia Beach adopted an Airport Noise Attenuation and Safety Ordinance in 1994 (Lasley 1997). The ordinance officially adopts the 1978 NAS Oceana AICUZ boundaries as an overlay zone. Uses in overlay zones are subject to additional development controls. As-of-right uses (i.e., uses permitted in each zoning district without conditions) are not prohibited in any of the particular noise zones. However, residential uses to be developed in Noise Zones 2 and 3 must have applicable acoustical treatments as required under the Virginia Uniform Statewide Building Code. Conditional uses (i.e., uses that are permitted in various zoning districts only if they meet certain development standards) are more stringently controlled in AICUZ overlay zones. Certain noise sensitive conditional uses (e.g., schools, hospitals, churches, outdoor amphitheaters, etc.) are prohibited in most APZs and Noise Zone 3, and require acoustical treatment in Noise Zone 2 (Lasley 1997).

The City of Chesapeake neither limits nor prohibits the development of property that was permitted under its zoning classification at the time the AICUZ program was established. However, the rezoning of a property to a classification incompatible with the AICUZ program is not permitted (City of Chesapeake 1993).

Lands surrounding NAS Oceana are zoned as follows:

- Areas north of the station are primarily zoned for residential use, with lands along arterial roadways zoned for a mixture of business, residential, and office uses;
- Areas west of the station along London Bridge Road and east of Lynnhaven Parkway are predominantly zoned for industrial, commercial, and residential uses;
- Areas east of the station between Oceana Boulevard and Birdneck Road are predominantly zoned for industrial use with areas east of Birdneck Road zoned for residential and preservation uses;
- Areas south and southwest of the station are, in general, zoned for agriculture, interspersed with large areas zoned for residential use along London Bridge Road and Holland Road; and

- Areas southeast of the station along Oceana and General Booth boulevards are large areas of land zoned for residential and agricultural uses (City of Virginia Beach 1994).

The majority of lands within 0.5 mile of NALF Fentress are zoned for agricultural use and low-density residential development (City of Chesapeake 1993).

Coastal Zone Management Program

The Coastal Zone Management Program, adopted by the Commonwealth of Virginia and approved by the United States Department of Commerce, establishes several policies and objectives regarding the use and development of the coastal zone (United States Department of Commerce 1992a). Under the Virginia Coastal Management Program (VCMP), the coastal zone is based on political boundaries and is defined as the tidewater area. The program is administered through eight enforceable permitting programs. These programs regulate fisheries management; subaqueous lands management; wetlands management; dunes management; non-point source pollution control (i.e., Virginia's erosion and sediment control regulations); point source pollution control (i.e., Virginia's pollutant discharge elimination system permit program); shoreline sanitation; and air pollution control (i.e., Virginia's State Implementation Plan enforcing the federal Clean Air Act). Projects that obtain approval through these programs are assumed to be consistent with the VCMP. The City of Virginia Beach is within the coastal zone; however, as defined in 16 USC 1453, federal property is excluded from the coastal zone.

The Coastal Zone Management Act Reauthorization Amendments of 1990 require that "...each federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs."

Integrated Natural Resource Management Plan

The purpose of the station's Integrated Natural Resource Management Plan is to provide a basis and guidance for a complete program of management for the installation's renewable natural resources. The plan describes land management, fish and wildlife, soil erosion and grounds maintenance, and water conservation (LANTDIV 1988a; LANTDIV 1988c). The plan provides policies and procedures to ensure the effective management of land in accordance with military objectives and environmental standards and guidelines.

3.1.5 Socioeconomics and Community Services

Several data sources were used to collect information on existing/baseline conditions in south Hampton Roads. These sources include the U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, Virginia Employment Commission, Hampton Roads Planning District Commission, Virginia Employment Commission, and the cities of Virginia Beach and Chesapeake. Each agency publishes data at different intervals and different frequencies. In order to provide the most accurate description of current conditions, the most recent data available from each source were used to present the baseline descriptions. Based upon the frequency at which the data are published, information for the period from 1990 to 1995 was used to describe existing conditions.

3.1.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

As of FY 1996 (October 1, 1995), the total population at NAS Oceana was 8,100 military and civilian employees, including 740 officers, 5,580 enlisted personnel, 1,380 civilians, and 400 contractor employees. Personnel loading at NAS Oceana by major activity is shown on Table 3.1-19, and projected loadings are shown on Table 3.1-20. The largest activities were the F-14 and the A-6 squadrons. As of the beginning of FY 1996, 2,520 personnel were assigned to the squadrons.

The total base loading figures for the first day of FY 1996 show a substantial decrease in personnel strength at NAS Oceana since the beginning of FY 1990 (October 1, 1989). On October 1, 1989, a total of 12,500 personnel was assigned to NAS Oceana including 1,290 officers, 9,340 enlisted personnel, 1,360 civilian employees, and 510 contractor employees (Schember 1995).

Personnel loading at NAS Oceana is projected to increase over the next two years without implementation of the proposed action. A-6 aircraft squadrons at the station have been decommissioned, reducing the overall personnel loadings by approximately 700 military billets. However, additional F-14 aircraft have recently been moved to NAS Oceana, increasing the number of military personnel assigned to the station by 1,800 persons. The transfer of the additional F-14 aircraft to NAS Oceana is not part of the proposed action, and its impact has already been subject to NEPA documentation. Therefore, this personnel movement is considered part of the baseline personnel loading at NAS Oceana. As shown in Table 3.1-20, without the proposed action, the station population increased to approximately

Table 3.1-19

CURRENT PERSONNEL LOADING AT NAS OCEANA[a]

Activity/Tenant	Officers	Enlisted	Civilians	Contractors	Total
Squadrons	400	2,120	0	0	2,520
NAS Oceana	50	1,720	560	100	2,430
VF-101	180	840	0	0	1,020
NEX Oceana	0	10	300	10	320
NAMTRADET	0	280	0	0	280
PWC Virginia Beach Site	0	0	210	0	210
FACSFAC VACAPES	10	130	0	10	150
COMFITWINGLANT	20	30	0	0	50
COMATKWINGLANT	10	30	0	0	40
All Other Activities/Tenants	70	420	310	280	1,080
Totals	740	5,580	1,380	400	8,100

[a]Data presented as of FY 1996.

Key:

COMATKWINGLANT = Commander Attack Wing Atlantic.
COMFITWINGLANT = Commander Fighter Wing Atlantic.
FACSFAC VACAPES = Fleet Air Control Surveillance Facility/Virginia Capes.
NAS = Naval Air Station.
NEX = Naval Exchange.
NAMTRADET = Naval Air Training Detachment.
PWC = Public Works Center.

Source: Schember 1995.

Table 3.1-20 PROJECTED PERSONNEL LOADINGS FOR NAS OCEANA		
	FY 1996	FY 1997
Personnel at beginning of FY	8,100	8,800
A-6 Decommissioning	-300	-300
A-6 AIMD and ATKWING Support Staff	NA	-100
Realignment of F-14 FRS Detachment[a]	NA	+150
Realignment of Pacific Fleet F-14 Aircraft[b]	+600	+600
Transfer of F-14 Support Personnel	+400	+50
Transfer of F-14A Aircraft[c]	NA	+300
End of Fiscal Year	8,800	9,500

a Result of 1993 BRAC mandates.
b Result of 1995 BRAC mandates.
c Result of action separate form BRAC.

Key:

FY = Fiscal year.
AIMD = Aircraft Intermediate Maintenance Department.
ATKWING = Attack Wing.
FRS = Fleet Replacement Squadron.

Source: U.S. Navy 1995a.

8,800 military and civilian personnel by the end of FY 1996 and is projected to increase to approximately 9,500 personnel by the end of FY 1997 (September 30, 1997).

NAS Oceana is located in the City of Virginia Beach in southeastern Virginia. The area immediately surrounding the station is known as south Hampton Roads, which consists of the cities of Chesapeake, Norfolk, Portsmouth, Suffolk, and Virginia Beach. Data from civilian personnel employed at NAS Oceana were used to estimate the geographical distribution of all personnel (military and civilian) employed at NAS Oceana. As shown on Table 3.1-21, the majority of civilian and military personnel stationed at NAS Oceana are assumed to live in south Hampton Roads, with the largest portion of these personnel residing in the City of Virginia Beach (74%), distantly followed by the City of Chesapeake (9%).

Table 3.1-21

GEOGRAPHICAL DISTRIBUTION OF PERSONS EMPLOYED AT NAS OCEANA

Geographical Area	Percentage of Personnel
City of Virginia Beach	74.2
City of Chesapeake	9.3
City of Norfolk	5.9
City of Portsmouth	2.5
City of Suffolk	0.9
Total in South Hampton Roads	92.8
All Other Locations	7.2

Source: Countryman 1995.

According to the U.S. Bureau of the Census, the total 1990 population of the City of Virginia Beach was 393,069 persons, making it the largest city in south Hampton Roads (U.S. Bureau of the Census 1992). The 1993 population in the city was estimated to be 416,200 persons (Hampton Roads Planning District Commission 1995). The 1993 population in Chesapeake was estimated to be 170,400 persons, making it the third largest city in south Hampton Roads, after Virginia Beach and Norfolk (Hampton Roads Planning District Commission 1995).

Virginia Beach, Chesapeake, and south Hampton Roads as a whole experienced rapid growth during the 1980s. From 1980 to 1990, the total population in Virginia Beach increased by nearly 50% over the 1980 population level of 262,199 persons. Chesapeake's total population increased by over 32% from 1980 to 1990, growing from 114,486 to 151,976 total persons. During the same time period, south Hampton Roads expanded approximately 21%, from 795,862 residents in 1980 to 962,322 residents in 1990 (see Table 3.1-22).

Table 3.1-22

TOTAL POPULATION OF THE CITIES LOCATED IN SOUTH HAMPTON ROADS DURING 1980, 1990, AND CURRENT CONDITIONS

	Total Population			Percent Change 1980 to 1990
	1980	1990	Current Conditions[a]	
City of Chesapeake	114,486	151,976	170,400	32.7
City of Norfolk	266,979	261,229	245,300	-2.2
City of Portsmouth	104,577	103,907	103,600	-0.6
City of Suffolk	47,621	52,141	53,800	9.5
City of Virginia Beach	262,199	393,069	416,200	49.9
South Hampton Roads	795,862	962,322	989,300	20.9

[a]Current population estimated as of 1993.

Source: Hampton Roads Planning District Commission 1995.

The total population of Virginia Beach, Chesapeake, and south Hampton Roads as a whole is projected to continue to grow. By the end of this decade, the total population of Virginia Beach is expected to reach 440,024 residents; by the year 2015, the total population is projected to reach 505,522 persons. The population of the City of Chesapeake is projected to grow to 210,271 by 2000, and 253,535 by 2015. South Hampton Roads as a whole is expected to experience population increases over the next 20 years, with total population projected to reach 1,095,280 residents in the year 2000. By 2015, the total population of the region is expected to climb to 1,239,625 persons (see Table 3.1-23).

Table 3.1-23 POPULATION PROJECTIONS FOR THE CITIES LOCATED IN SOUTH HAMPTON ROADS				
	Total Population			
City	Current Levels[a]	2000	2010	2015
City of Chesapeake	170,400	210,271	238,796	253,535
City of Norfolk	245,300	263,234	262,451	262,348
City of Portsmouth	103,600	105,841	106,314	106,376
City of Suffolk	53,800	75,910	99,016	111,844
City of Virginia Beach	416,200	440,024	491,398	505,522
South Hampton Roads	989,300	1,095,280	1,197,975	1,239,625

[a]Current population estimated as of 1993.

Source: Hampton Roads Planning District Commission 1995;
Hampton Roads Planning District Commission 1993.

Economy, Employment, and Income

The U.S. military's presence in south Hampton Roads has a significant beneficial impact on the region's economy. Currently, nine major military installations are located in south Hampton Roads including four military installations in the City of Virginia Beach. Naval Base Norfolk, which consists of Naval Station Norfolk and Naval Air Station Norfolk; Naval Amphibious Base Little Creek; Fleet Combat Training Center Dam Neck; Naval Security Group Activity Northwest; Naval Air Station Oceana; Norfolk Naval Shipyard; and Fort Story are all located in the south Hampton Roads area.

Total 1991-1992 defense-related employment in south Hampton Roads was 147,200 persons. This included 102,900 military personnel, 38,300 civilians employed at United States Department of Defense (DoD) facilities, and 6,000 persons employed at private shipbuilding firms (Hampton Roads Planning District Commission 1994).

The payroll and procurement expenditures made by the DoD inject substantial amounts of federal funds into the regional economy. In 1990, total DoD expenditures or obligations in south Hampton Roads reached approximately $4.6 billion. By 1992, this figure had increased to slightly more than $5.2 billion. The cities of Virginia Beach and Norfolk received the majority of these expenditures; in 1990 these cities received $1.1 billion and $2.7

billion in DoD revenues, respectively. These city totals increased to an estimated $1.2 billion and $3.1 billion, respectively by 1992 (Hampton Roads Planning District Commission 1994).

Total DoD wages and salaries injected nearly $3.4 billion into the south Hampton Roads' economy in 1990 and approximately $3.7 billion in 1992. During the same time periods, total DoD procurement contract awards in south Hampton Roads were recorded at $909 million in 1990 and at $1.1 billion in 1992 (Hampton Roads Planning District Commission 1994).

NAS Oceana was responsible for a substantial portion of these funds. In FY 1990, NAS Oceana injected $275 million in the regional economy through payroll expenditures and nearly $12.6 million via procurement expenses. In addition, approximately $29.7 million was spent by the NAS Oceana Resident Officer-in-Charge of Construction (ROICC) on construction projects during FY 1990 (Ashe 1995).

As total base loading at NAS Oceana began to decline in the early 1990s, the amount of funds the station spent locally began to decline. By FY 1995, total payroll and procurement expenditures by NAS Oceana had declined to $244 million and $6.3 million, respectively (Christiansen 1995). However, during the same time, construction expenditures remained relatively constant; FY 1995 construction expenditures were approximately $30 million (Ashe 1995).

Tourism is also a very important industry in the south Hampton Roads area. In 1994, approximately $236 million was spent on hotel/motel/tourist court and campsite lodging in the regional economy. The majority (60.0%) of this total was generated at facilities located in the City of Virginia Beach, with the remainder of the total being generated in Norfolk (29.8%); Chesapeake (6.3%); Portsmouth (2.5%); and Suffolk (1.4%) (Hampton Roads Planning District Commission 1995).

In 1990, service industries, which employed 33% of the labor force, was the largest employment sector in south Hampton Roads. The next largest employment sector in the region was retail sales and trade, which provided 22.7% of the employed labor force with work. Manufacturing, public administration, and construction, were the next largest employment sectors. These industries provided jobs to 11.8%, 9.0%, and 8.3% of the employed labor force, respectively (U.S. Bureau of the Census 1992).

Unemployment rates in Virginia Beach and Chesapeake have been slightly less than that for south Hampton Roads, while Portsmouth and Suffolk have had substantially higher unemployment rates than the regional levels. As shown on Table 3.1-24, the most recent annual average unemployment rate (1994) for the cities of Virginia Beach and Chesapeake was 4.6% and 5.2%, respectively, compared to the region's overall rate of 5.6%.

Table 3.1-24

1993 AND CURRENT LABOR FORCE STATISTICS FOR THE CITIES LOCATED IN SOUTH HAMPTON ROADS

City	1993		Current Conditions[a]	
	Civilian Labor Force	Unemployment Rate (%)	Civilian Labor Force	Unemployment Rate (%)
City of Chesapeake	85,015	4.6	87,938	5.2
City of Norfolk	94,142	6.3	96,849	6.4
City of Portsmouth	46,510	7.3	48,358	8.4
City of Suffolk	25,095	6.7	25,918	7.1
City of Virginia Beach	199,148	4.4	205,272	4.6
South Hampton Roads	449,910	5.3	464,335	5.6

aCurrent labor force statistics as of 1994.

Source: Hampton Roads Planning District Commission 1995.

During the same time period, Portsmouth and Suffolk experienced average annual unemployment rates of 8.4% and 7.1%, respectively. All municipalities in south Hampton Roads had experienced an increase in unemployment rates after 1993, with the City of Portsmouth experiencing the largest increase (Hampton Roads Planning District Commission 1995).

Based on data collected by the U.S. Bureau of Economic Analysis, south Hampton Roads is considered a relatively affluent region. As shown on Table 3.1-25, the City of Virginia Beach had the highest per capita income in the region ($20,285). The City of Portsmouth experienced the lowest per capita income at $16,595 (Hampton Roads Planning District Commission 1995).

Housing

The U.S. Navy provides housing to eligible military personnel stationed at NAS Oceana. These housing units include both bachelor (officer and enlisted) quarters and family housing units. The Bachelor Officer Quarters (BOQ) and the Bachelor Enlisted Quarters (BEQ) operated at NAS Oceana currently can house 201 officers and 2,006 enlisted personnel, respectively. The BEQs are operating at a 79% occupancy rate and house

Table 3.1-25

1990 AND CURRENT PER CAPITA INCOME FOR CITIES LOCATED IN SOUTH HAMPTON ROADS

City	1990 Per Capita Income ($)	Current[a] Per Capita Income ($)
City of Chesapeake	16,914	18,337
City of Norfolk	14,851	17,198
City of Portsmouth	14,778	16,595
City of Suffolk	15,867	17,853
City of Virginia Beach	18,928	20,285

[a]Current per capita income as of 1993.

Source: Hampton Roads Planning District Commission 1995.

approximately 20% of the total enlisted population stationed at NAS Oceana. Typically, personnel in lower pay grades reside in the BEQ. In September 1995, 88% of the personnel residing in NAS Oceana's BEQ were grades E1 to E4 personnel; 11% were grades E5 and E6 personnel; and the remaining 1% were grades E7 to E9 personnel (Harnitchek 1995).

Eligible military personnel stationed at NAS Oceana may be assigned to Navy family housing. Family housing is administered regionally to personnel stationed at NAS Oceana; Little Creek Amphibious Base; Fleet Combat Training Center Dam Neck; Naval Base Norfolk; and Norfolk Naval Shipyard. As of 1996, there were approximately 3,900 Navy family housing units located in the south Hampton Roads region (LANTDIV 1997). This number is expected to increase to approximately 4,900 units by 2001 with planned new construction and completion of several on-going rehabilitation projects.

NAS Oceana families can be assigned to housing at any installation located in south Hampton Roads. Each eligible sailor is allowed to place his or her name on the waiting list for adequate family housing at either of two installations; and inadequate family housing at an additional two facilities. The choice of which installation a sailor applies to is left completely to the discretion of the individual (Larue 1995). The total family housing requirement, which is the number of units required to house all Navy personnel with dependents assigned to south Hampton Roads in public or private housing units, is approximately 49,000 housing units (LANTDIV 1997).

According to the U.S. Census Bureau, 363,835 dwelling units are located in south Hampton Roads as of 1990 (latest available census data). This included 147,037 units in the City of Virginia Beach and 55,742 units in the City of Chesapeake.

In 1990, the majority (55.5%) of the housing stock in south Hampton Roads was single-family detached structures. The remaining 44.5% of the region's housing stock was made up of townhouses (11.9%), duplexes (4.8%), multi-family units (25%), mobile homes (1.9%), and other units (0.9%) (U.S. Bureau of the Census 1992). Table 3.1-26 shows the composition of housing units in each city in south Hampton Roads.

Table 3.1-26

COMPOSITION OF HOUSING CHARACTERISTICS FOR CITIES IN SOUTH HAMPTON ROADS (%)

City	Single Family	Townhouses	Duplexes	Multi-Family	Mobile Homes	Other
City of Chesapeake	68.1	9.9	2.7	14.7	3.9	0.7
City of Norfolk	45.0	6.2	9.0	37.9	1.0	0.8
City of Portsmouth	60.1	7.0	6.0	25.5	0.5	0.9
City of Suffolk	75.3	2.7	6.9	9.2	5.0	0.9
City of Virginia Beach	53.8	19.1	2.1	22.3	1.9	0.7
South Hampton Roads	55.5	11.9	4.8	25.0	1.9	0.9

Note: Percentages may not add to 100% due to rounding.

Source: U.S. Bureau of the Census 1992.

The 1990 median value of owner-occupied housing units in Virginia Beach was $96,500. This figure is significantly higher than the median value of owner-occupied housing units in the other cities located in south Hampton Roads during the same time period. Corresponding to the relatively high property values in the City of Virginia Beach, rental prices in the city were also significantly higher than elsewhere in the region. In 1990, the median contract rent for a housing unit was $484 in the City of Virginia Beach compared to a median contract rent of only $250 in the City of Suffolk (see Table 3.1-27).

During 1990, homeowner vacancy rates in Virginia Beach were slightly higher than the vacancy rates elsewhere in south Hampton Roads. The 1990 homeowner vacancy rate in Virginia Beach was 4%, higher than that of the City of Suffolk (see Table 3.1-27).

Table 3.1-27

SELECTED HOUSING CHARACTERISTICS FOR CITIES LOCATED IN SOUTH HAMPTON ROADSa

City	Total Housing Units	Homeowner Vacancy Rate (%)	Median Value ($)	Rental Vacancy Rate (%)	Median Contract Rent ($)
City of Chesapeake	55,742	3.4	88,200	9.0	399
City of Norfolk	98,762	2.9	74,500	10.6	361
City of Portsmouth	42,283	2.9	67,400	10.6	327
City of Suffolk	20,011	1.9	70,700	7.0	250
City of Virginia Beach	147,037	4.0	96,500	8.1	484

aHousing characteristics as of 1990.

Source: U.S. Bureau of the Census 1992.

During 1990, both Norfolk and Portsmouth had rental vacancy rates of 10.6%. The City of Suffolk had the lowest rental vacancy rate with a rate of 7% (see Table 3.1-27) (U.S. Bureau of the Census 1992).

Taxes and Revenues

Local governments in south Hampton Roads raise a large proportion of their total revenues from local sources, with the remainder of their revenue being supplied by the state or federal government. Property tax is the largest single source of funds generated locally by municipalities in south Hampton Roads. Property tax is assessed on real property, personal property, public service corporations, and machinery and tools. In addition to levying property taxes, the local governments have the authority to raise revenues through a local option on the state sales tax, a consumer utility tax, hotel and motel room tax, restaurant food tax, tobacco tax, and emergency telephone service tax. Local governments also raise money from permits, privilege fees, and regulatory licenses; fines and forfeitures; charges for services; interest; and rental and sale of property.

Table 3.1-28 displays the amount and source of local government revenues during FY 1994 for all municipalities in south Hampton Roads. For comparative purposes, this table also includes the local per capita tax burden for each city in south Hampton Roads. As shown on the table, the City of Suffolk has the lowest per capita tax burden in the region while the City of Chesapeake has the highest local per capita tax burden.

Table 3.1-28

LOCAL GOVERNMENT REVENUES BY SOURCE AND LOCAL PER CAPITA TAX BURDEN FOR CITIES LOCATED IN SOUTH HAMPTON ROADS[a]

City	Property Taxes (in $1,000)	Local Sales Tax Option (in $1,000)	Other Local Sources (in $1,000)	Total Local Sources (in $1,000)	Inter-Governmental Revenue (in $1,000)	Total Revenues (in $1,000)	Local Per Capita Tax Burden (in dollars)
City of Chesapeake	$125,247	$14,882	$52,071	$192,200	$126,474	$318,674	$1,127.30
City of Norfolk	134,792	21,174	100,992	256,959	180,445	437,403	1,047.53
City of Portsmouth	49,098	4,209	38,143	91,449	95,983	187,432	882.71
City of Suffolk	27,701	2,789	14,787	45,276	43,752	89,029	841.57
City of Virginia Beach	252,453	29,203	136,604	418,260	274,367	692,627	1,004.95

Note: Totals may not add up to 100% due to rounding.

a Data presented are for fiscal year 1994.

Source: Commonwealth of Virginia, Auditor of Public Accounts, 1995.

A breakdown of local government expenditures is shown on Tables 3.1-29 and 3.1-30. Table 3.1-29 provides data on the amount of funds expended by spending category. As shown on this table, education was the largest single expense for local communities in south Hampton Roads. Education accounts for approximately half of all expenditures made by the local governments. Public safety expenditures, which include police, fire, and emergency services, is the next largest local government expense and accounts for 12% to 19% of total annual expenditures made by local governments.

To assist in comparisons among cities in south Hampton Roads, Table 3.1-30 shows the per capita expenditures made by each local government by spending category. As shown, per capita expenditures on education range from a low of $815.70 per resident in the City of Norfolk to a high of $955.24 per resident in the City of Chesapeake. Public safety spending ranges from $180.67 per resident in the City of Virginia Beach to $320.76 per resident in the City of Norfolk. Other large spending categories were public works expenditures which includes the costs of providing water and sewage treatment facilities and solid waste management; expenditures on health and welfare programs; and expenditures to maintain and operate parks and recreational facilities.

3.1.5.2 Community Services

Fire and Emergency Services

Structural, firefighting, and hazardous materials (HAZMAT) services are provided to NAS Oceana from the fire station located in Building 220. In addition, crash vehicles are located at the intersection of the main and crosswind runways in the event of an aircraft accident. NAS Oceana provides primary firefighting services for all facilities on the station and to the Wadsworth Housing Complex which is located off base. NAS Oceana has a mutual aid agreement with the City of Virginia Beach and the City of Chesapeake to assist in firefighting when necessary.

Currently, there are 52 full-time firefighting personnel assigned to the NAS Oceana Fire Department. In addition to providing emergency response capabilities, the NAS Oceana Fire Department is also responsible for conducting fire prevention and fire safety programs and performing building inspections. The department has three pumpers for use on structural fires on the station and three crash vehicles dedicated for airfield use (Dixon 1995). During fiscal year 1994, the NAS Oceana Fire Department responded to 323 emergency calls at the airfield and 422 emergency calls elsewhere at NAS Oceana (Reppert 1995a).

Table 3.1-29

LOCAL GOVERNMENT EXPENDITURES BY CATEGORY FOR CITIES IN SOUTH HAMPTON ROADS[a]
(figures expressed in $1,000)

City	General Administration	Judicial	Public Safety	Public Works	Health and Welfare	Education	Parks and Recreation	Community Development	Total Expenditures
City of Chesapeake	$11,156	$4,229	$41,610	$31,868	$25,108	$162,773	$7,281	$3,523	$287,548
City of Norfolk	13,428	6,196	78,683	33,201	49,098	200,092	26,016	8,849	415,563
City of Portsmouth	7,531	2,611	29,995	16,300	22,946	92,902	8,054	1,894	182,233
City of Suffolk	3,540	2,131	12,948	2,658	11,091	44,438	2,895	949	80,650
City of Virginia Beach	20,249	3,881	75,195	65,815	34,331	357,948	21,450	18,578	597,447

[a] Data presented are for fiscal year 1994.

Source: Commonwealth of Virginia, Auditor of Public Accounts, 1995.

Table 3.1-30

PER CAPITA LOCAL GOVERNMENT EXPENDITURES BY CATEGORY FOR CITIES IN SOUTH HAMPTON ROADS[a]
(in dollars)

City	General Administration	Judicial	Public Safety	Public Works	Health and Welfare	Education	Parks and Recreation	Community Development
City of Chesapeake	65.47	24.82	244.19	187.02	147.35	955.24	42.73	20.67
City of Norfolk	54.74	25.26	320.76	135.35	200.15	815.70	106.06	36.08
City of Portsmouth	72.69	25.20	289.53	157.33	221.49	896.74	77.74	18.28
City of Suffolk	65.79	39.61	240.66	49.41	206.15	825.98	53.82	17.64
City of Virginia Beach	48.65	9.33	180.67	158.13	82.49	860.04	51.54	44.64

[a]Data presented are for fiscal year 1994.

Source: Commonwealth of Virginia, Auditor of Public Accounts, 1995.

Fire and emergency services off station are supplied by the City of Virginia Beach Fire Department. In 1990, there were 17 fire stations located within the city, including five stations that were owned by volunteer forces. Virginia Beach is served by 327 full-time and 200 volunteer firefighters. Ten emergency medical service (EMS) facilities were located throughout the city and were manned by 630 volunteer personnel (City of Virginia Beach 1991).

The City of Chesapeake Fire Department provides fire and emergency services to that city. The department operates 14 fire stations and maintains 240 uniformed personnel, who are supported by 25 volunteer firefighters and 46 Emergency Management Service (EMS) volunteers. The city currently maintains a ratio of 1.6 uniformed personnel per 1,000 residents (City of Chesapeake 1990).

Security Services

Security forces at NAS Oceana consist of 86 active-duty military personnel. In the event of natural disasters, threat of war, and other unique security situations, the security force at NAS Oceana can be expanded by 10 to 15 auxiliary personnel who are reassigned from each major command/activity on the station (Reppert 1995b).

The NAS Oceana Security Department completes three distinct functions: administrative, investigation, and operations. As of September 1995, 16 personnel were assigned to completing the administrative tasks including the issuance of passes and decals; file management; preparation of instructional manuals; and conducting crime prevention programs. As part of their function to complete investigative services, four NAS Oceana personnel investigate all misdemeanor and felony cases that are waived by the Naval Criminal Investigative Service. Sixty-six military personnel were assigned to the security operations. These personnel provide traffic control, crowd control, perimeter patrols, flight line security, restrictive area security, fire/security dispatch services, physical security, military inspections, movement control, and process offenders. These personnel manned three secure access points and eight flight line checkpoints (Reppert 1995b).

NAS Oceana has mutual aid agreements with the cities of Virginia Beach and Chesapeake. In addition, for emergencies occurring at or near the Dare County Bombing Range, NAS Oceana has mutual aid agreements with Tyrell County, Dare County, and the U.S. Air Force (Reppert 1995b). In 1994, security personnel at NAS Oceana responded to 4,060 emergency calls on the station (Reppert 1995a).

Security services off-station are provided by the City of Virginia Beach Police Department. In 1990, the department had a total of 609 police officers, which resulted in an

approximate ratio of 1.5 police officers for every 1,000 residents (City of Virginia Beach 1991).

The Chesapeake Police Department, which is broken up into five precincts, has a total of 239 sworn police officers, 49 civilian personnel, and 33 part-time school crossing guards. As a result of these staffing levels, there are approximately 1.6 police officers for every 1,000 residents of the city (City of Chesapeake 1990).

Medical Services

The Branch Medical Clinic provides comprehensive medical care at NAS Oceana. Services include ambulatory care, radiology, urgent care, and several other services. The clinic is an outpatient facility and has no beds. The clinic accommodates active-duty military personnel, military dependents, retired military personnel, and Civil Service employees. As a member of the TRICARE System, the clinic is linked to other military treatment facilities in the Tidewater area. In 1990, the Branch Medical Clinic treated a total of 61,790 active-duty patients. In 1992, only 30,502 active-duty patients were treated; but by 1994, the clinic treated a total of 44,977 active-duty patients (Wilson 1995).

Approximately 5,910 square feet used (532 square meters) for care of active-duty personnel prior to 1990 has been converted into an Ambulatory Care Clinic and an increase in the area dedicated for obstetrics services. Because both the Ambulatory Care Clinic and the obstetrics services are primarily utilized by military personnel dependents, the amount of square footage available to treat active-duty personnel has declined since 1990. Dental services are provided by a detachment of the Naval Dental Center, Norfolk, Branch Dental Clinic Oceana, which is housed in the same building as the Branch Medical Clinic Oceana (Wilson 1995).

Recreational Facilities

The NAS Oceana Morale, Welfare, and Recreation (MWR) Department provides a full complement of recreational facilities and services to military personnel and their dependents assigned to NAS Oceana. MWR on-station facilities encompass 652 acres (261 hectares) and 68 buildings. The on-station facilities include swimming pools, athletic fields, a golf course; stables; bowling alleys; an officer's club, enlisted club, and Chief Petty Officer (CPO) club; tennis courts; an archery range; skeet and trap range; fitness and jogging trails; racquetball and squash courts; and a fitness/health center (Lytle 1995).

The City of Virginia Beach also has numerous recreational areas located throughout its boundaries. Federal, state, and local parklands are available to residents of the city. Back

Bay National Wildlife Refuge, a portion of Mackay Island National Wildlife Refuge, First Landing (Seashore) State Park, False Cape State Park, Trojan Waterfowl Management Area, and Pocahontas Waterfowl Area are all located in the City of Virginia Beach. In addition, the city maintained approximately 2,390 acres (956 hectares) of neighborhood, community, and district parklands in 1990. Using a National Recreational Association standard of 7 acres (2.8 hectares) of parkland per 1,000 residents, in 1990 Virginia Beach was able to provide 89% of the standard (City of Virginia Beach 1991).

The City of Chesapeake operates and maintains parks and recreational facilities throughout the city including the Northwest River Park, six community recreation centers, two senior citizen centers, and numerous community and neighborhood parks (City of Chesapeake n.d.).

Education

School-age military dependents residing in the NAS Oceana family housing attend the City of Virginia Beach public school system. This system consists of 51 elementary schools, 12 middle schools, nine high schools, an adult learning center, two special education schools, a vocational/technical school, and an open campus school.

In recent years, the Virginia Beach School District has experienced rapid expansion of its student body. In the early 1990s, enrollment was increasing by nearly 1,800 students a year. The rate of expansion has declined somewhat over the last few years; enrollment in the school district is now increasing by approximately 1,000 students each year (Lumpkin 1995).

In response to this rapid growth in enrollment, the district has built or expanded six elementary schools, one middle school, and one high school since 1990. This rapid expansion of educational facilities is expected to continue through the year 2002.

The average daily membership (i.e., average number of children enrolled) in the Virginia Beach School District is 72,551 students. Elementary school-age children (K through 7) account for 48,900 students; secondary (8 through 12) students account for the remaining 23,651 students. Based on these membership figures, the pupil/teacher ratio for grades K through 7 was 15.8 to 1, and the pupil/teacher ratio for grades 8 through 12 was 12.3 to 1. The school district pupil/teacher ratios were substantially better than those required in the 1992 *Standards of Quality* (Virginia Department of Education n.d.).

A substantial portion of the total enrollment in the Virginia Beach School District is attributed to federally connected students. Federally connected students are those students who have at least one parent employed by the federal government and/or reside on federal property such as a military installation, an Indian reservation, or in low-income housing.

Because the federal government is not required to pay local taxes, the U.S. Department of Education provides impact aid to school districts affected by major federal installations in an effort to relieve the fiscal burden placed on these districts. Impact aid is distributed based on the average daily attendance of federally connected students. Children that meet both criteria (i.e., have both a parent that works for the federal government and live off federal property) are known as "A" students. Students that meet only one of these criteria are known as "B" students. An affected school district receives more impact aid for "A" students than it receives for "B" students.

The average daily attendance of children in the Virginia Beach schools who have at least one parent in the military and live on a military installation, Indian reservation, or in low-income housing (known as military "A" students) is 3,990 students. The average daily attendance of students who have at least one parent in the military but who live in privately owned housing (known as military "B" students) is 19,600 students. Similarly, the average daily attendance of civilian "B" students is 5,160 children, while only one civilian "A" student attends the district (Galvin 1995).

As a result of the attendance of total federally connected students, the Virginia Beach Public School District received a total of $9,900,000 in impact aid in 1994. The majority of these funds were allocated to the city because of the large number of military "A" and military "B" students that attended its schools. Impact aid for these categories of students amounted to $4,720,000 and $4,375,000, respectively (Galvin 1995).

The City of Chesapeake School District maintains 41 buildings, including 27 elementary schools, six junior high/middle schools, five high schools, one vocational center, one alternative school, and one special education facility. Average daily membership in the school system is 32,582 students. Approximately 65% of the student body (21,422 students) are elementary school students (K through 7); the remaining 35% (11,140 students) are secondary students (grades 8 through 12). The average pupil/teacher ratio is 16 students per one teacher for kindergarten through seventh grade. The pupil/teacher ratio for grades 8 through 12 is 14.4 students per one teacher. The district-wide student/teacher ratio exceeds that required by 1992 *Standards of Quality* (Virginia Department of Education n.d.).

Similar to Virginia Beach, Chesapeake is experiencing rapid growth in school enrollment. The 1995-1996 operating budget makes provisions for 900 additional students, the opening of a new elementary school, and additions to five other schools (City of Chesapeake n.d.).

3.1.6 Infrastructure and Utilities

3.1.6.1 Water Supply

NAS Oceana

Water is supplied to NAS Oceana by the City of Norfolk, which obtains water from a series of reservoirs located in the cities of Suffolk, Norfolk, and Virginia Beach. The water is delivered to the station through a series of pipes owned by the City of Norfolk, the City of Virginia Beach, and the Navy, and eventually is distributed throughout NAS Oceana from the pumping station in Building 1020.

To ensure the availability and efficiency of the water distribution system on station, the water pumps and motors in Building 1020 are being upgraded. In addition, a 12-inch- (30.5-centimeter-) diameter potable water feed has been constructed onto the station from Virginia Beach's existing water line along London Bridge Road. The new 12-inch line is a back-up to the existing system and is not intended to increase on-site capacity (Patterson 1995).

At present, the integrity of the water system is good, and the station is not experiencing a water quantity or quality problem (Switzer 1995).

Regional Systems

The City of Norfolk has two water supply systems that have a combined rating capacity of 104 million gallons per day (MGD) (394 million liters per day [MLD]) (Saul 1995). Current demand for water from this system is estimated at 60 to 70 MGD (227 to 265 MLD). On average, the City of Norfolk delivers 0.59 MGD (2.24 MLD) of water to NAS Oceana (Geer 1995). The remaining water is distributed to residents in the City of Norfolk, other county and city governments, and military installations in the region.

The City of Virginia Beach receives an average flow of approximately 32 MGD (121 MLD) from the City of Norfolk. The only other source of water in Virginia Beach comes from a limited number of private wells. Currently, Virginia Beach's water supply does not meet demand, and restrictive flow measures have been implemented since February 1992. It is estimated that if the water flow was unrestricted, 3 MGD (11.4 MLD) more water would be used within the city. At present, Virginia Beach has a moratorium on the extension of water lines to undeveloped areas within its jurisdiction (Leahy 1995).

The City of Chesapeake receives its water from three sources. The primary source is the Northwest River from which Chesapeake is permitted to extract 10 MGD (37.9 MLD)

through water intakes along the river. During periods of low water levels in the Northwest River, the water intakes are subject to organics and saltwater intrusion, thus degrading the quality of the water. In an attempt to have a more reliable source of potable water, Chesapeake has plans for a new treatment plant which through the process of reverse osmosis will eliminate the organics and salt problem. Chesapeake also is permitted to purchase 3.75 MGD (14.2 MLD) from the City of Norfolk and 3 MGD (11.4 MLD) from the City of Portsmouth. Within 2 to 3 years, the deliverable quantity from Portsmouth is scheduled to increase to 5 MGD (18.9 MLD) (Sanders 1995).

In order to increase the availability of water in the region, local governments have undertaken the Lake Gaston Project. The Lake Gaston Project involves the construction of an 85-mile (136.9-kilometer), 60-inch (153-centimeter) pipeline which will transport 60 MGD (227 MLD) of raw water to the region from the Virginia Power Company's Lake Gaston and Roanoke River hydroelectric power project reservoir along the North Carolina/Virginia border. The scheduled receivers of this regional water supply are Isle of Wight County (1 MGD [3.79 MLD]) and the cities of Chesapeake (10 MGD [37.9 MLD]) and Virginia Beach (48 MGD [182 MLD]). Water withdrawals commenced in August 1997, and the project is scheduled to be fully operational by the summer of 1998 (Leahy 1995; Sanders 1995; Cecchinni 1997).

3.1.6.2 Wastewater System

NAS Oceana

The wastewater generated on station is collected through a combined series of gravity and force mains that range in size from 3 to 24 inches (8 to 61 centimeters) in diameter. Although the system had recently experienced infiltration/inflow, corrective actions have been taken to eliminate these problems (Switzer 1995). In addition, as part of an ongoing operation and maintenance program, the PWC Norfolk recently inspected the piping network on the station via an electronic monitor. On the basis of the inspection, PWC has undertaken the task of replacing and repairing the deficient areas of the piping network. Also, PWC is in the process of replacing five pumping stations and installing monitoring systems.

Regional Systems

All wastewater generated at NAS Oceana is treated at the Hampton Roads Sanitation District's (HRSD) Atlantic Sewage Treatment Plant. The HRSD constructs, operates, and

maintains the system's major sewage treatment plants, pump stations, and sewer mains. The Atlantic Sewage Treatment Plant has a design capacity that allows it to process sewage at an approximate rate of 36 MGD (136 MLD). The plant has an excess capacity of 10 MGD (38 MLD), based upon current flows. A unique feature of the Atlantic plant is that it is interconnected with two other treatment plants. The flow of wastewater between treatment plants is based on the path of least resistance. Overall, the three plants have a combined excess capacity of 23 MGD (88 MLD) (Benson 1995).

3.1.6.3 Stormwater

NAS Oceana contains all of its stormwater runoff with a network of culverts and drainage ditches that allows the runoff flow to follow topographic contours. Runoff eventually leaves the boundaries of the station at four different points and empties into water bodies surrounding the station.

Runoff collected south of the crosswind runways flows in a southerly direction and eventually empties into West Neck Creek or a small pond located just outside the station's boundary. Stormwater collected north of the crosswind runways flows west, north, and east ultimately discharging into London Bridge Creek, Wolfsnare Creek, and Great Neck Creek, respectively (see Section 3.1.9). NAS Oceana currently holds a Virginia Pollutant Discharge Elimination System (VPDES) permit for discharge of stormwater drainage from four external points and three internal points on the station (Loop 1995).

3.1.6.4 Electrical

The Virginia Power Company supplies electric power through a 34.5-kilovolt (kV) line that breaks into three separate 34.5-kV lines at a switching station on Harpers Road. The 34.5-kV line leading to the station was replaced in September 1995 (Ryan 1995). Three switches at the switching station on Harpers Road have recently been replaced and the project is scheduled to be completed in the fall of 1996. The 34.5-kV line from switch Z has been upgraded providing full service for back-looping.

From the Harper's Road switching station, the electricity is fed to four substations, which step-down the voltage to 4.16 kV for distribution. Within the past three years, all the substations have been upgraded and are now in service (Barrett 1995).

Electricity is used mostly for lighting, air conditioning, and other nonheating purposes. It is estimated that only 5% of the electricity brought to the station is used for heating purposes (Barrett 1995).

3.1.6.5 Heating

Steam is the primary source of heat at NAS Oceana and is generated at the boiler plant in Building 601. The plant consists of four boilers that burn natural gas and have a capacity for generating steam at a rate of 60,000 pounds (27,000 kilograms) per hour each (240,000 pounds [108,000 kilograms] per hour in total). Peak demand is generally at 100,000 pounds (45,000 kilograms) per day, indicating that the plant has a surplus capacity. Three of the four boilers can burn No. 4 heating oil for backup (Atwood 1994; Ryan 1995).

The steam is distributed to buildings on the station through a series of aboveground and underground high-pressure lines that range in size from 6 to 12 inches (15.2 to 30.5 centimeters) in diameter. The steam's residual water condensate is returned to the boiler plant through a series of low-pressure lines and is reintroduced into the boilers.

3.1.6.6 Jet Fuel

Jet fuel is supplied to NAS Oceana from the U.S. Navy Craney Island Fuel Depot. The fuel is barged from the depot to a contractor-owned fuel depot (Mercer's Landing). From there, the fuel is transferred by pipeline to the station's fuel storage farm located along London Bridge Road. Currently, this farm has two 840,000-gallon (3,184-kiloliter) fuel tanks and one 420,000-gallon (1,592-kiloliter) bulk storage tank. From the tank farm, the jet fuel is transported by an aboveground pipeline which continues below ground under the runways to a 210,000-gallon (796-kiloliter) cut-and-cover day tank. From this day tank, the fuel is piped to fuel pits along the flight line.

A military construction (MILCON) project, P414, will replace the 420,000-gallon bulk storage tank. A second 210,000-gallon clay tank is currently under construction and will replace hot aircraft refueling areas (i.e., fuel pits) along the flight line; this project is scheduled for completion in August 1998.

3.1.6.7 Solid Waste Management

Approximately 6,700 tons (6,030 metric tons) of solid waste is generated annually at NAS Oceana and is collected by PWC Norfolk and disposed of at the Southeastern Public Service Authority's Regional Landfill in Suffolk, Virginia. The Suffolk Landfill, located approximately 48 miles (77 kilometers) from the station, is approximately 450 acres (182 hectares) and is expected to be in operation until the year 2010. Bulk waste (i.e., large-sized scrap materials, construction waste) generated at the station is delivered directly to the landfill; this constitutes approximately 3% of the total waste generated. Typical household

and operational waste is trucked from the station to one of three transfer stations in the area. Eighty-nine percent of the total waste generated at the station is delivered to the Landstown Transfer Station, 7% to the Oceana Transfer Station, and the remaining waste to the Chesapeake Transfer Station.

On-station recycling is managed through the MWR Department. This program collects cardboard, aluminum cans, plastic milk jugs, 2-liter soda bottles, newspaper/ magazines, computer paper, ledger paper, tab cards, various marketable metals, wood pallets, glass bottles, and steel cans (Vanetta 1995). As of September 28, 1995, the MWR had collected 752 tons (677 metric tons) of recyclable materials for marketable resale in FY 1995 (Vanetta 1995). Household-generated recyclable waste is collected by MWR employees from collection bins located in more densely populated areas within the station. In addition, centralized collection stations and on-call collection services are available for large-sized recyclable wastes. Because recyclable wastes are sold at a competitive market price, different receiving companies are utilized (Vanetta 1995).

3.1.7 Transportation

3.1.7.1 Regional Road Network

NAS Oceana is served by a network of local and regional roadways providing access to surrounding communities. Access to NAS Oceana from the north is provided by Great Neck Road (State Route [SR] 632), First Colonial Road (SR 615), and Atlantic Avenue and Pacific Avenues (SR 60). Vehicles approaching from the west and east utilize arterial roadways including Virginia Beach Boulevard (US Business Route [BUS] 58), the Virginia Beach Expressway (SR 44), Laskin Road (US Route 58), Birdneck Road, Lynnhaven Parkway, Holland Road, and Dam Neck Road. Vehicular traffic from the south uses General Booth Boulevard (SR 149), Holland Road, London Bridge Road, and Princess Anne Road. (Note that these public roads are distinguished from the on-station London Bridge and Princess Anne roads.)

The majority of traffic destined for NAS Oceana converges along Oceana Boulevard (SR 615), which runs along the eastern portion of the station, providing access to the main gate. The roadway network in the vicinity of NAS Oceana is shown on Figure 3.1-19.

3.1.7.2 Station Road Network

The NAS Oceana road network consists of 10 roads and three gates that allow access to various points on the station. Roadways are generally oriented northeast to southwest,

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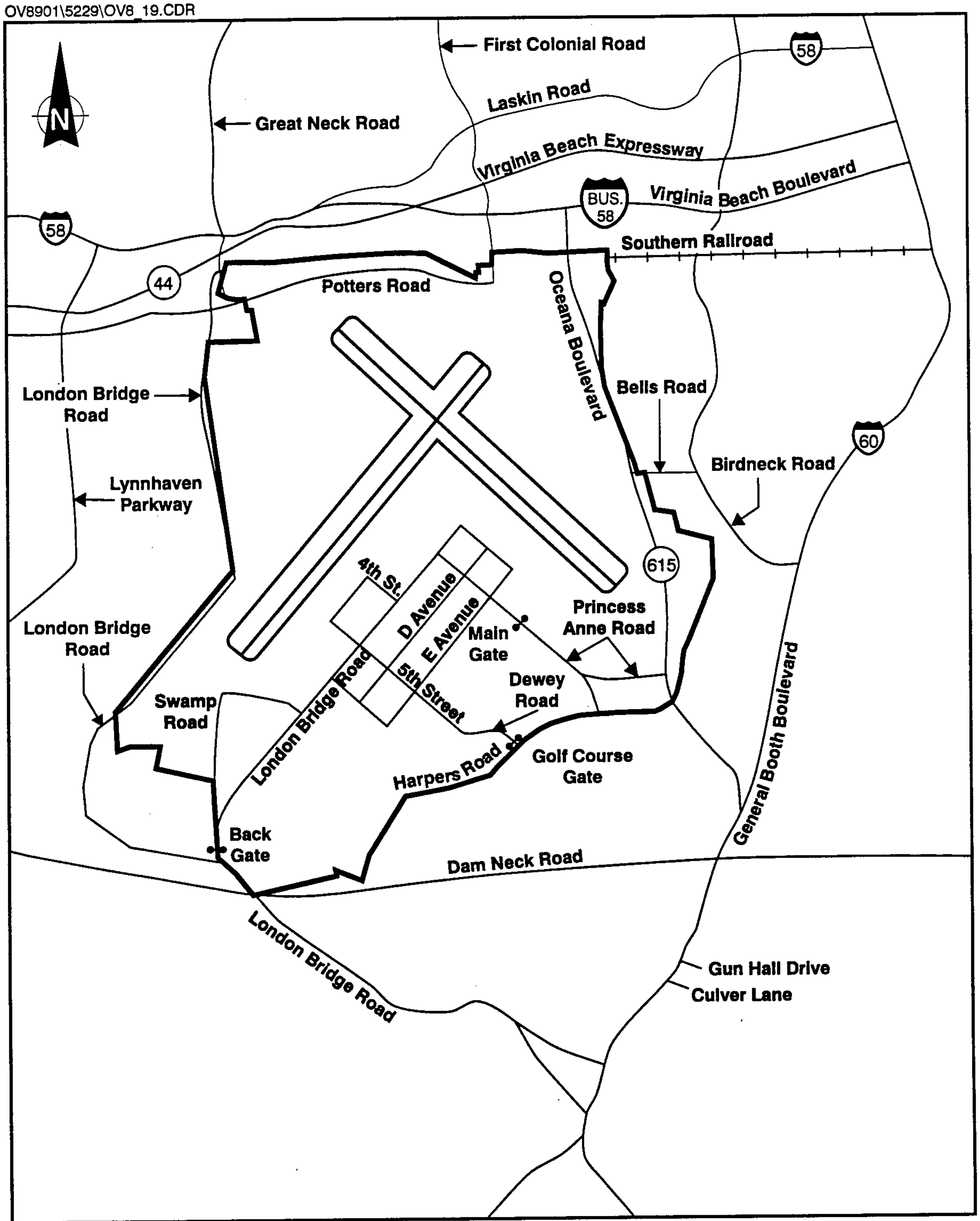

SOURCE: Hampton Roads Planning District Commission 1995c

SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 3.1-19 MAJOR ROADS IN VICINITY OF NAS OCEANA

conforming to the layout of the station's runways. In general, the two primary roads, London Bridge Road and Princess Anne Road, have priority with regard to traffic movements, with intersecting roads controlled by two-way stop signs. While no on-station intersections have signals, a few of the busier intersections have four-way stop signs. During peak periods, especially in the late afternoon, minor short-term traffic congestion occurs along London Bridge Road and Princess Anne Road near station gates, evidenced by vehicle queuing (i.e., stacking of cars in line) to exit the installation. Otherwise traffic appears to circulate in a relatively uncongested manner (Curnutte 1995).

Three gates provide access to the station: the main gate, which provides access to Oceana Boulevard and Harpers Road; the back gate, which is located at the southwest portion of the station and provides access to London Bridge Road; and the station's golf course gate, which provides access to Harpers Road only for special events that bring high traffic volumes into the station. Table 3.1-31 presents 1995 weekday and weekend traffic volumes for the main and back gates.

3.1.7.3 Existing Traffic Conditions

The performance of a roadway segment is identified by comparing traffic volumes to physical characteristics of the road such as street width, number of lanes, signals, and other factors which impact traffic flow. Measurements such as volume to capacity (V/C) ratios are combined with physical components of the roads to develop a level of service (LOS) for a particular segment. LOS is a subjective ranking given to a road segment ranging from "A" through "F," with "A" indicating free-flow conditions and "F" indicating roadway congestion and significant interruptions of steady traffic flow on the entire segment. At intersections, LOS describes the ability to safely conduct turning movements. Traffic modeling techniques allow for LOS calculations for each separate turning movement at an intersection, which can then be aggregated into a combined LOS for all movements.

In general, traffic flows in and around NAS Oceana exhibit moderate traffic levels and operate at acceptable LOSs (see Table 3.1-32 and Figure 3.1-20). Some road segments, however, operate at a LOS of F, indicating frequent occurrences of congestion and queuing. Roads operating at LOS F include First Colonial Road between Virginia Beach Boulevard and State Route 44, Oceana Boulevard between Virginia Beach Boulevard and Princess Anne Road, Virginia Beach Boulevard between First Colonial Road and Oceana Boulevard, and London Bridge Road between Swamp Road and Shipps Corner (HRPDC 1995c).

With regard to the on-station road network, PWC Norfolk conducted LOS analysis at key intersections along London Bridge Road and Princess Anne Road (U.S. Navy 1996).

Table 3.1-31

NAS OCEANA GATE COUNTS
(September 25 to October 1, 1995)

Time	Main Gate Weekday Average		Main Gate Saturday		Main Gate Sunday		Back Gate Weekday Average		Back Gate Saturday		Back Gate Sunday	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Total Traffic Counts	7,471	7,482	4,226	4,424	3,997	3,964	8,448	4,206	4,715	2,272	4,125	1,982
AM Peak Hour	6:00 (855)	11:00 (674)	11:00 (302)	11:00 (401)	11:00 (245)	10:00 (294)	6:00 (906)	11:00 (302)	11:00 (415)	11:00 (214)	11:00 (317)	11:00 (157)
PM Peak Hour	12:00 (635)	3:00 (823)	12:00 (328)	12:00 (438)	2:00 (410)	1:00 (353)	3:00 (853)	3:00 (654)	12:00 (421)	3:00 (216)	2:00 (393)	12:00 (176)

Source: Reppert 1995b.

Table 3.1-32

CURRENT TRAFFIC CONDITIONS ON ROADS IN VICINITY OF NAS OCEANA

Road	Number of Lanes	1990 Daily Vehicle Volume	EB/NB	WB/SB	V/C	ADT LOS
Princess Anne Road (on base)	4	18,864	9,396	9,468	0.19	C
Princess Anne Road (on base)- NASO Main Gate to Oceana Blvd.	4	8,144	4,109	4,035	0.17	C
London Bridge Road (on base)	4	9,667	4,873	4,794	0.10	C
Harpers Road - Dam Neck to Oceana Blvd.	2	1,828	886	942	0.12	C
Harpers Road - Dam Neck to London Bridge	4	11,495	5,736	5,759	0.24	C
Oceana Boulevard - Virginia Beach Blvd. to Bells	2	23,153	11,655	11,498	1.46	F
Oceana Boulevard - Bells to Princess Anne (NASO)	2	22,794	11,390	11,404	1.43	F
Oceana Boulevard - Princess Anne (NASO) to Harpers	4	15,651	8,439	7,212	0.30	C
Oceana Boulevard - Harpers to Flicker Way	4	25,372	12,657	12,715	0.53	D
Oceana Boulevard - Flicker Way to General Booth	4	26,309	13,157	13,152	0.55	D
First Colonial Road - Base Boundary to Indiana Avenue	4	2,000	814	1,186	0.05	C
First Colonial - Indiana to Virginia Beach Blvd.	4	3,356	1,637	1,719	0.07	C
First Colonial - Virginia Beach Boulevard to Expressway	4	34,635	21,771	12,864	0.54	F
London Bridge Road - Swamp Rd. to Shipps Corner	2	26,922	13,521	13,401	1.12	F
London Bridge Road - Shipps Corner to Crusader Circle	2	13,164	6,612	6,552	0.55	E
London Bridge Road-Crusade Circle to International Parkway	2	12,809	6,431	6,378	0.54	E
Great Neck Road - Potters Road to Laskin Rd.	2	10,399	5,169	5,230	0.43	D
Virginia Beach Blvd. - Lynnhaven to Great Neck Road	8	11,652	7,041	4,611	0.10	A

Table 3.1-32

CURRENT TRAFFIC CONDITIONS ON ROADS IN VICINITY OF NAS OCEANA

Road	Number of Lanes	1990 Daily Vehicle Volume	EB/NB	WB/SB	V/C	ADT LOS
Virginia Beach Blvd. - London Bridge Rd. to Chapel Lake	8	16,706	11,919	1,787	0.25	B
Virginia Beach Blvd. - Chapel Lake to Fountain Dr.	2	1,737	873	854	0.04	B
Virginia Beach Blvd. - Fountain Dr. to First Colonial	2	2,418	1,074	1,344	0.04	B
Virginia Beach Blvd. - First Colonial to Oceana	2	31,546	11,143	20,403	0.46	F
Virginia Beach Blvd. - Oceana to Shipps Ln.	4	11,557	1,404	10,153	0.06	B
Virginia Beach Blvd. - Shipps Ln. to Birdneck	4	12,396	1,066	10,571	0.44	B
VA Beach/Norfolk Expressway (SR 44) - Lynnhaven to Great Neck	8	62,044	28,064	33,980	0.41	B
VA Beach/Norfolk Expressway (SR44) - Great Neck to First Colonial	6	40,112	17,131	22,981	0.34	B
VA Beach/Norfolk Expressway (SR44) - First Colonial to Birdneck	6	18,780	13,499	5,281	0.26	A
Laskin Road - Great Neck to Victor Cr.	4	35,946	21,502	14,444	0.60	E
Laskin Road - Victor Cr. to First Colonial	4	32,933	19,823	13,110	0.55	E
Laskin Road - First Colonial to Birdneck Rd.	6	39,784	20,460	19,324	0.57	C
Bells Road - Birdneck to Oceana Blvd.	2	6,221	3,439	3,182	0.04	C
Birdneck Road - General Booth to Bells	2	10,633	5,201	5,432	0.22	D
Birdneck Road - Bells to Owl's Creek	2	12,910	6,268	6,642	0.28	E

Table 3.1-32 (Cont.)

Note: LOS based on Generalized Annual Average Daily Volumes for Area's Transitioning into urbanized areas as established in Level of Service Standards and Guidelines Manual for Planning (Florida Department of Transportation 1992).

Key:

A =	Free-flow conditions.
B =	Stable flow conditions with few interruptions.
C =	Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D =	Approaching unstable flow; still tolerable operating speeds, however low maneuverability.
E =	Traffic at capacity of segment; unstable flows with little or no maneuverability.
EB/NB =	Eastbound and Northbound.
F =	Forced flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
V/C =	Volume/Capacity ratio.
WB/SB =	Westbound and Southbound.

Source: HRPDC 1995c.

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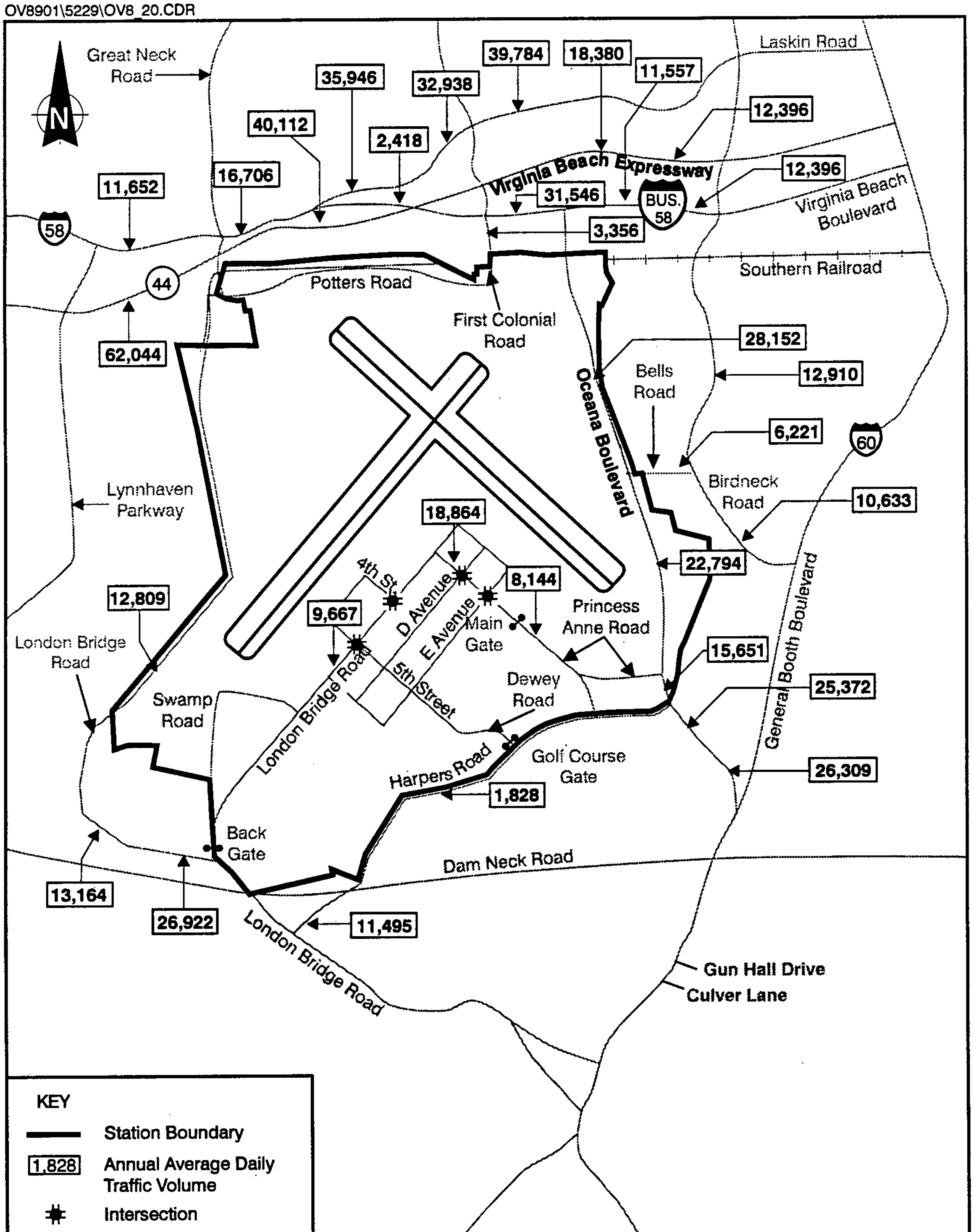

SOURCE: Hampton Roads Planning District Commission 1995c

Figure 3.1-20 EXISTING TRAFFIC CONDITIONS ON ROAD SEGMENTS IN THE VICINITY OF NAS OCEANA

These intersections are operating at an LOS of "A" or "B" during both the morning and evening peak hours.

3.1.7.4 Planned Road Improvements

Virginia Beach has adopted a Capital Improvement Program (CIP) to allocate funds for roadway improvements in the city. Several of the roads surrounding NAS Oceana are slated for improvement. Table 3.1-33 lists the projects within the area surrounding NAS Oceana as summarized in the FY 1993-94 / FY 1998-99 CIP. The most significant of these planned improvements is the upgrading of Oceana Boulevard to a four-lane divided arterial from Virginia Beach Boulevard to General Booth Boulevard, scheduled for construction between 1997 and 1999.

3.1.8 Noise

The sound we hear is the result of a sound source inducing vibration in the air. The measurement of sound involves three basic physical characteristics: intensity, frequency, and duration. Intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. Sound frequency is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized by rumbles or roars; high-frequency sounds are characterized by sirens or screeches. Duration addresses the temporal nature of the sound pattern. Continuous sounds are those produced for relatively long periods, such as engine maintenance (run-ups). Intermittent sounds are those which are produced for short periods such as aircraft takeoffs and landings (USEPA 1978).

Noise, or unwanted sound, is generally defined as sound pressure with an intensity that is greater than the ambient or background sound pressures (May 1978). This is determined by measuring noise emissions in terms of the sound pressure in a logarithmic unit known as a decibel (dB). A sound level of 0 dB is approximately the threshold of human hearing and is barely audible, even under very quiet conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort, and higher dB levels are felt as pain (Wyle Labs 1997).

Because of the logarithmic nature of the decibel unit, sound levels cannot be arithmetically added or subtracted. However, there are some basic rules that are useful in dealing with dB levels. First, if a sound's intensity doubles, the sound level increases by 3 dB (e.g., 60 dB + 60 dB = 63 dB). Secondly, the total sound level produced by two sounds of different levels is usually only slightly higher than the higher of the two (e.g., 60 dB + 70 dB = 70.4 dB). Because the addition of sound levels is different than that of ordinary

Table 3.1-33

PROPOSED ROADWAY IMPROVEMENTS IN THE VICINITY OF NAS OCEANA

Road Name	Proposed Improvement	Construction Dates
Oceana Boulevard - Virginia Beach Blvd. to General Booth Road	Expand to a four-lane divided arterial	4/97-1/99
London Bridge Road - International Parkway to Route 44	Construct a new four-lane divided highway	NA
London Bridge Road - Shipps Corner to Dam Neck	Expand to a four-lane highway	6/96
London Bridge Road - Swamp Road to Dam Neck	Widen	1997
London Bridge Road - Rest of road from International Parkway to Shipps Corner	Expand to a four-lane highway	NA
Potters Road - London Bridge Road to First Colonial	Widen	10/97
Route 44 (Virginia Beach-Norfolk Expressway)	Expand to an eight-lane access controlled expressway	Not in CIP
Birdneck Road - Southern Blvd. to General Booth Blvd.	Expand to a four-lane divided highway	6/97-12/99
New Road (to be named) - Princess Anne at Courthouse Loop to General Booth Blvd.	Construct a four-lane divided roadway	NA
Ferrell Parkway (New Road) - Upton Drive to Sandfiddler Rd.	Construct a two-lane divided arterial	NA
Holland Road - Landstown Road to Ferrell Parkway	Expand to a four-lane divided highway	NA
Laskin Road - First Colonial Road to Birdneck Road	Expand to a six-lane divided highway	NA
Laskin Road - Great Neck to First Colónial Road	Expand to an eight-lane divided highway	1999
Princess Anne Road/Ferrell Parkway - Landstown Road to Courthouse Loop and General Booth Boulevard	Construct four lane road on eight-lane ROW	NA
Southeastern Expressway	Construct a four-lane controlled access highway	Pending further study

Key:

CIP = Capital Improvement Program.

Source: HRPDC 1995b.

numbers, such addition is often referred to as "decibel addition" or "energy addition" (Wyle Labs 1997). These terms reflect the fact that when adding dB values, each are first converted to their corresponding acoustic energy, added, and then converted back to their dB equivalent.

Sound frequency is measured in cycles-per-second or hertz (Hz). Persons with normal hearing can detect sounds that range in frequency from about 20 Hz to 15,000 Hz, but are most sensitive to frequencies in the 1,000-Hz to 4,000-Hz range (USEPA 1978). In measuring environmental noise, the characteristics of human hearing are taken into account by using the "A-weighted" decibel scale, which adjusts the very high and very low frequencies to approximate the human ear's lower sensitivity to these frequencies (USEPA 1978). It should be noted that all noise analyses presented in this DEIS use the A-weighted scale represented by the dB unit.

Noise metrics used in environmental analyses refer to units that quantitatively measure the effect of noise on the environment. The first of these is the A-weighted maximum sound level (L_{max}), expressed in dB, which represents the highest sound level measured in a single event during which dB values vary (e.g., aircraft overflight). Figure 3.1-21 presents L_{max} values for common sounds/events.

However, individual time-varying noise events have two main characteristics, a sound level that changes and the time period during which the event is heard. Although the L_{max} provides some measure of the intrusiveness of the event, it alone does not completely describe the period of time during which the sound is heard. The sound exposure level (SEL) takes into account both of these factors. The SEL is a measure of the total sound energy associated with a single aircraft event and is useful in calculating noise impacts from aircraft flyovers. Aircraft noise will vary from event to event according to aircraft type and model (engine type); aircraft configuration (i.e, flaps, landing gear, etc.); engine power settings; aircraft speed; and the distance between the observer and the aircraft flight track (FICON 1992). The SEL is a logarithmic measure expressed in A-weighted dB, that represents the sound level of a constant sound that would, in one second, generate the same sound level as the actual time-varying event. For sound from aircraft overflights, which typically last more than one second, the SEL is usually greater than the L_{max}. The SEL does not represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire noise event.

Noise metrics used in environmental studies typically consider sound levels that occur over a specified period of time. The day-night average sound level (Ldn) has been determined to be a reliable measure of community sensitivity to aircraft noise and has become the standard metric used in the United States for aircraft noise. Ldn takes into account both the

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NOISE SOURCE (at a given distance)	A-WEIGHTED SOUND LEVEL SCALE (dBA)	NOISE ENVIRONMENT	HUMAN JUDGMENT OF NOISE LOUDNESS [(1)]
Civil Defense Siren (100 ft)	130	Carrier Flight Deck	
			Threshold of Pain
Pile Driver (50 ft)	110	Rock Music Concert	32 Times as Loud
F-18 Departure (1,000 ft)	108		16 Times as Loud
F-18 Arrival (1,000 ft)	104		
			Very Loud
Ambulance Siren (100 ft)	100		
F-14 Departure (1,000 ft)	97		
Newspaper Press (5 ft)			8 Times as Loud
Power Lawn Mower (3 ft)			
Motorcycle (25 ft)	90	Boiler Room	4 Times as Loud
Prop. Plane Flyover (1,000 ft)		Printing Press Plant	
F-14 Arrival (1,000 ft)	83		
Diesel Truck, 40 mph (50 ft)			
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	2 Times as Loud
			Moderately Loud
Passenger Car, 65 mph (25 ft)			
Living Room Stereo (15 ft)	70		
Vacuum Cleaner (3 ft)			
Electronic Typewriter (10 ft)			
Normal Conversation (5 ft)	60	Data Processing Center	1/2 as Loud
Air Conditioning Unit (100 ft)		Department Store	
Light Traffic (100 ft)	50	Private Business Office	1/4 as Loud
Bird Calls (Distant)	40	Lower Limit of Urban Ambient Sound	Quiet 1/8 as Loud
Soft Whisper (5 ft)	30	Quiet Bedroom	
	20	Recording Studio	Just Audible Threshold of Hearing
	10		
	0		

NOTE: [(1)] Relative to a reference loudness of 70 dBA

SOURCE: Ogden 1992; Wyle Labs 1997.

Figure 3.1-21 SOUND LEVELS OF TYPICAL NOISE SOURCES AND NOISE ENVIRONMENTS

noise levels of all individual events that occur during a 24-hour period and the number of times those events occur. The averaging of noise over a 24-hour period does not ignore the louder single events. Rather, Ldn emphasizes both the sound level and number of events. For Ldn measurements, aircraft SELs are averaged at a location over a complete 24-hour period, with a 10-dB adjustment added to those noise events occurring between 10:00 p.m. and 7:00 a.m. the following morning. This adjustment represents the added intrusiveness of sounds that occur during normal sleeping hours, as a result of increased sensitivity during these periods and lower ambient noise levels (i.e., typically about 10 dB lower during nighttime hours). Like SEL, Ldn represents a sound exposure rather than the sound level heard at any particular time. The logarithmic nature of the dB unit used to describe Ldn causes sound levels of the loudest events to significantly influence the 24-hour average (FICON 1992). Therefore, a few maximum sound events occurring during daylight-hour aircraft flights have a strong influence on the 24-hour Ldn value, even though low sound levels between flights may predominate in terms of duration.

Another cumulative noise metric that is useful in describing noise is the equivalent sound level (Leq). Leq is calculated to determine the steady-state noise level over a specified time period within the 24-hour period considered by the Ldn metric. The Leq metric can provide a more accurate quantification of noise exposure for a specific period, particularly for daytime periods when the nighttime penalty under the Ldn metric is inappropriate.

The noise metric used to analyze operations on MTRs and in special use airspace (restricted areas and MOAs) is a variant of the more familiar Ldn used at airfields. Unique to military aircraft operations is the requirement to fly at a low altitude at speeds in excess of 250 knots. To accurately represent the impacts of these operations, the Ldn metric is adjusted to account for the surprise or startle effect experience from these high-speed, low-altitude operations. The adjusted Ldn is designated as the onset-rate adjusted day-night average sound level (Ldnmr). Because of the sporadic nature of these operations, the number of daily operations is determined from the number of flying days in the calendar month with the highest number of operations in the affected airspace or MTR in order to avoid seasonal periods of low activity. This metric is denoted Ldnmr. The DoD uses the program MR_NMAP to calculate Ldnmr values for MTRs and special use airspace.

The results of attitudinal surveys, conducted to find percentages of people who express various degrees of annoyance when exposed to different levels of Ldn, are very consistent. The most useful metric for assessing people's responses to noise impacts is the percentage of the exposed population expected to be "highly annoyed." A wide variety of

responses have been used to determine intrusiveness of noise and disturbances of speech, sleep, television or radio listening, and outdoor living. The concept of "percent highly annoyed" has provided the most consistent response of a community to a particular noise environment. Annoyance may be viewed as any negative subjective reaction to noise on the part of an individual or group. Annoyance is often quantified by the percentage of people who are annoyed by noise. The response is remarkably complex, and when considered on an individual basis, widely varies for any given noise level (FICON 1992).

A number of nonacoustic factors have been identified that may influence the annoyance response of an individual. Newman and Beattie (1985) divided these factors into emotional and physical variables:

Emotional Variables

- Feelings about the necessity or preventability of the noise;
- Judgment of the importance and value of the activity that is producing the noise;
- Activity at the time an individual hears the noise;
- Attitude about the environment;
- General sensitivity to noise;
- Belief about the effect of noise on health; and
- Feeling of fear associated with the noise.

Physical Variables

- Type of neighborhood;
- Time of day;
- Season;
- Predictability of noise;
- Control over the noise source; and
- Length of time an individual is exposed to a noise.

Findings substantiate that community annoyance is reliably represented by Ldn. Several studies have indicated an 85 to 95% correlation between groups that state they are

highly annoyed by noise sources and levels of Ldn (USEPA 1978; Schultz 1978; Fidell et. al 1991). The "updated Schultz curve" cites the relationship between noise and annoyance (see Figure 3.1-22). This curve, which was originally developed in the 1970s and has been updated over the last ten years, remains the best available method to estimate community response to transportation noise including aircraft noise (FICON 1992).

Community noise studies conducted in the United States since 1972 have indicated that adverse effects resulting from aircraft operations, such as annoyance, sleep interference, and speech interference, are generally associated with exposures to sound levels exceeding an Ldn of 65 dB.

The effect of noise on human health can generally be divided into three categories: physiological, behavioral, and subjective. The primary physiological concern with noise is hearing loss.

Hearing Loss. Considerable data on hearing loss have been collected and analyzed. It has been well established that continuous exposure to high noise levels will damage human hearing (USEPA 1978). People are normally capable of hearing up to 120 dB over a wide frequency range. Hearing loss is generally interpreted as the shifting of a higher sound level of the ear's sensitivity or acuity to perceive sound. This change can either be temporary (TTS--temporary threshold shift) or permanent (PTS—permanent threshold shift) (Georgia Air National Guard 1995).

The EPA has established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96% of the population from greater than a 5 dB PTS (USEPA 1978). Similarly, the National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) identified 75 Ldn as the minimum level at which hearing loss may occur (CHABA 1977). However, it is important to note that continuous, long-term (40 years) exposure is assumed by both EPA and CHABA before hearing loss may occur.

Nonauditory Effects. Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, student achievement scores, birth weight, and mortality rates. The nonauditory effect of noise on humans is not as easily substantiated as the effect on hearing. The results of studies conducted in the United States, primarily concentrating on cardiovascular response to noise, have been contradictory (Georgia Air National Guard 1995). Cantrell (1976) concluded that the results of human and animal experiments show that average or intrusive noise can act as a stress-provoking stimulus.

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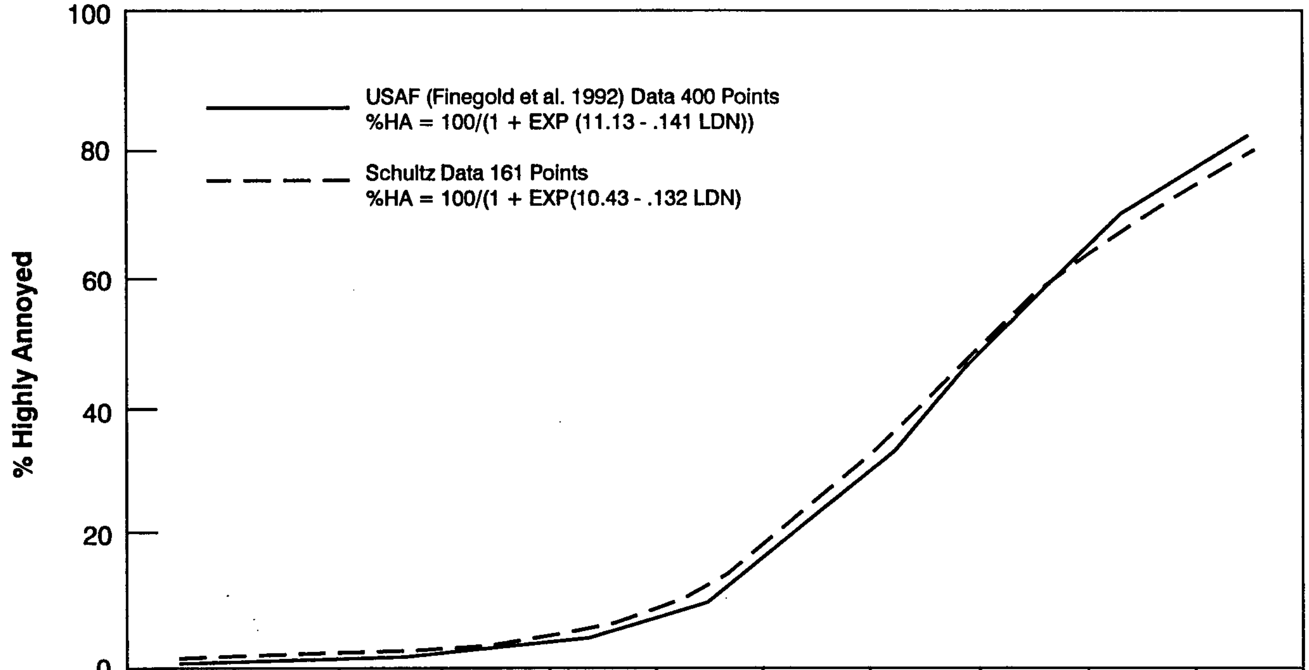


Day - Night Average Sound Level in dB		40	45	50	55	60	65	70	75	80	85	90
Calculated %HA Points	USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
	SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

SOURCE: FICON 1992.

Figure 3.1-22 COMPARISON OF LOGISTIC FITS TO ORIGINAL 161 DATA POINTS OF SCHULTZ (1978) AND USAF ANALYSIS WITH 400 POINTS (data provided by USAF Armstrong Laboratory)

Prolonged stress is known to be a contributor to a number of health disorders. Kryter (1980) states, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body." The psychological stresses may cause a physiological stress reaction that could result in impaired health.

The DoD AICUZ Program, established in the early 1970s, was designed to address community noise and safety impacts. The Navy continually evaluates operational procedures to mitigate noise and safety impacts wherever possible and works with communities and local governments to promote compatible land use development in the vicinity of military airfields.

The National Institute for Occupational Safety and Health and EPA commissioned CHABA to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA's conclusion was that:

> "evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence."

CHABA also reported that "many of the available foreign studies could be criticized on a methodological basis (studies were not adequately controlled for other known risk factors)."

Speech Interference. One of the most obvious effects of aircraft noise intrusion is speech interference. The disruption of leisure activities such as listening to the radio, television, music, and conversation is a primary source of annoyance, giving rise to frustration and irritation. In some situations, a high degree of intelligibility is essential to safety.

Speech is an acoustic signal characterized by rapid fluctuations in sound level and frequency pattern. It is essential for optimum speech intelligibility to recognize these continually shifting sound patterns. Not only does noise diminish the ability to perceive the auditory signal, but it also reduces a listener's ability to follow the pattern of signal fluctuation. Single-event noise levels above 65 dB can result in speech interference.

Sleep Interference. Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. Arousal from sleep is a function of a number of factors that include: (1) age, (2) sex, (3) sleep stage, (4) noise level, (5) frequency of noise occurrences, (6) noise quality, and (7) presleep activity. Because individuals differ in their physiology, behavior, habitation, and ability to adapt to noise, few studies have attempted to establish noise criterion levels for sleep disturbance.

Lukas (1972) concluded the following with regard to human sleep response to noise:

- Children 5 to 8 years of age are generally unaffected by noise during sleep.
- Older people are more sensitive to sleep disturbance than younger people.
- Women are more sensitive to noise than men.
- There is a wide variation in the sensitivity of individuals to noise even within the same age group.
- Sleep arousal is directly proportional to the sound intensity of aircraft flyover. While there have been several studies conducted to assess the effect of aircraft noise on sleep, none have produced quantitative dose-response relationships in terms of noise exposure level, Ldn, and sleep disturbance. Noise-sleep disturbance relationships have been developed based on single-event noise exposure.

The FAA has concluded from its research that "the physiological annoyance from the effects of sleep interference due to aircraft noise is probably more significant than the direct physiological consequences" (Georgia Air National Guard 1995). The effects of noise on sleep are not completely understood. Limited studies have been conducted on the short-and long-term after-effects such as psychological and physiological disorders or task performance degradation during periods following sleep disturbance. Reasonable quality sleep is a requisite for good health.

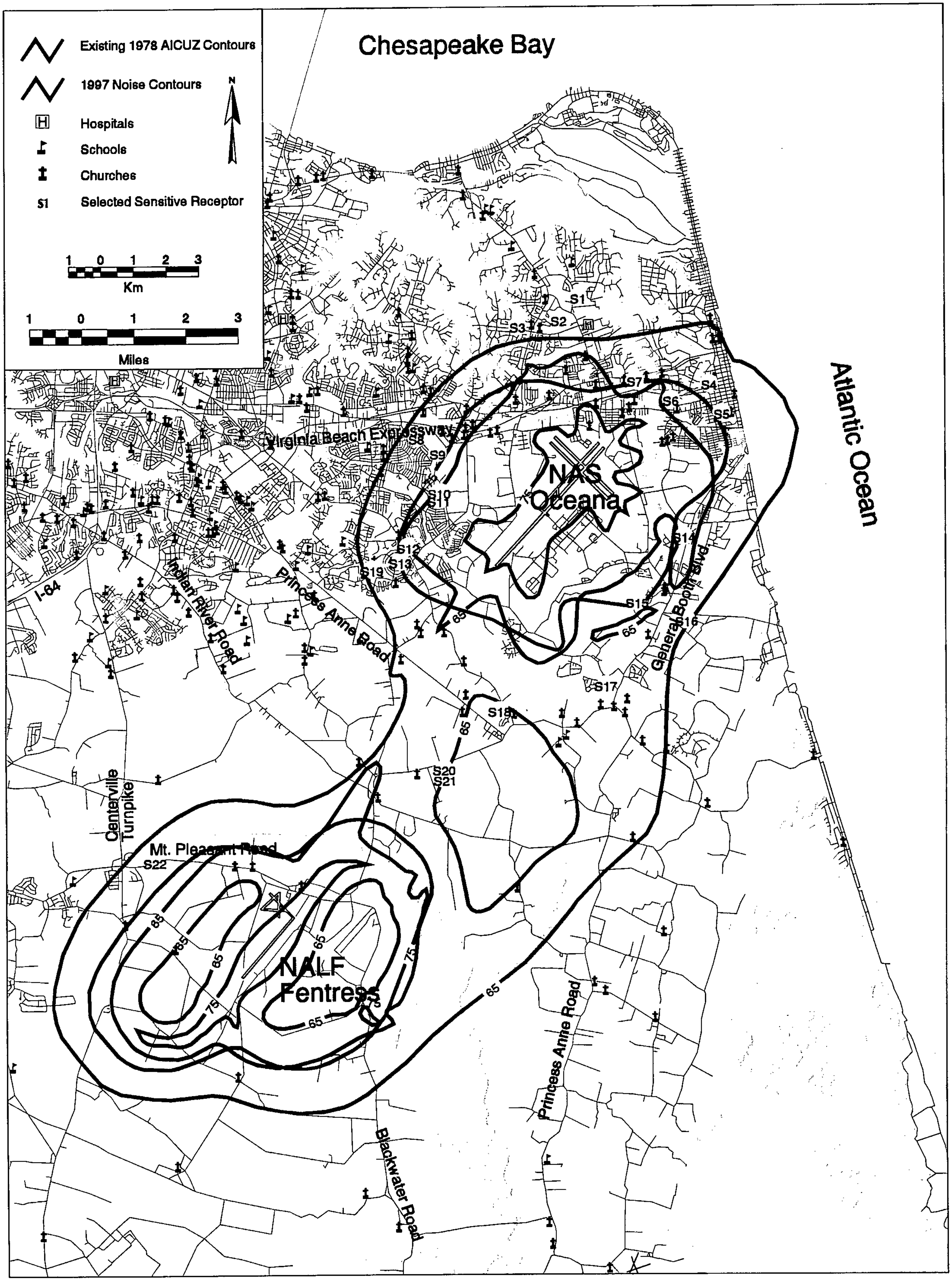
Performance Effects. The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on the worker.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-age children has received more attention in recent years. Several studies suggest that aircraft noise can impact performance in schools. Chronic exposure to aircraft noise can result in reading deficits and impaired speech perception (i.e., able to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech [Clayton 1978]) (Evans and Maxwell 1997). Specifically, the Evans study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Similar studies have found that children residing near the Los Angeles International Airport had more difficulty solving cognitive problems (Bronzaft 1997), and elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green 1982). Although many factors could contribute to learning deficits in school-age children (e.g., socioeconomic level, home environment, etc.), the growing body of evidence suggests that chronic exposure to high aircraft noise levels can impair learning. In response to these and other environmental studies, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (1997), requires federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

Various noise-sensitive land uses (e.g., schools) are located in proximity to NAS Oceana and NALF Fentress (see Figure 3.1-23). As part of the 1997 noise assessment, noise levels were calculated for selected schools located near NAS Oceana (see Table 3.1-34). Schools are considered compatible with exterior noise levels between 65 and 75 dB Ldn with incorporation of appropriate sound attenuation. The goal of sound attenuation is an interior environment of 45 dB. Because Ldn includes a penalty for nighttime operations, school-day



Source: U.S. Navy 1978; Wyle Labs 1997

Figure 3.1-23
Existing AICUZ and
1997 Noise Contours at NAS Oceana

Table 3.1-34

SCHOOLS PROXIMATE TO NAS OCEANA/NALF FENTRESS

Identification Number[a]/ Name	1997 Ldn (dB)	1997 Leq (dB)
S1 First Colonial High	59	59
S2 Lynnhaven Middle	61	61
S3 Trantwood Elementary	56	56
S4 Virginia Beach Middle	57	58
S5 Cooke Elementary	57	56
S6[b] Seatack Elementary	63	63
S7[b] Linkhorn Elementary	62	62
S8 Lynnhaven Elementary	55	54
S9 Plaza Middle	60	58
S10 Brookwood Elementary	66	64
S11 Plaza Elementary	67	66
S12 Holland Elementary	66	65
S13 Green Run Elementary	62	62
S14 Birdneck Elementary	67	61
S15 Corporate Landing Elementary & Middle	63	60
S16 Ocean Lake Elementary	57	54
S17 Strawbridge Elementary	58	58
S18 Kellam High	56	55
S19 Rosemont Elementary	59	58
S20 Princess Anne Elementary	52	51
S21 Princess Anne Middle	52	51
S22 Butts Road Intermediate	52	45

[a] Schools are shown on Figure 3.1-23.
[b] Seatack and Linkhorn elementary schools are being located.

Key:

Ldn = Day-night average sound level.
Leq = Equivalent sound level.
dB = Decibel.

Source: Wyle Labs 1997.

Leq (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) was calculated to better define existing school conditions. Use of central air conditioning systems in association with closed windows can be expected to reduce noise levels by approximately 25 dB. School sites with an exterior Leq of less than 70 dB would likely experience minimal interference. A site-specific engineering evaluation may be required to adequately evaluate indoor noise levels and the level/type of additional attenuation needed, if any.

The DoD currently uses NOISEMAP (Version 6.5), a widely accepted model that projects noise impacts around military airfields. Using SELs, aircraft type, power settings, and flight profiles for a given airfield as inputs, NOISEMAP calculates Ldn contours resulting from aircraft operations. Noise contours are developed using either the annual average day (AAD) or the average busy day (ABD) technique. AAD operations represent the total number of annual operations divided by the number of days in a year (365). The ABD is used when the AAD does not best represent the airfield noise environment. For example, where weekend operations are minimal or non-existent, ABD is more appropriate to describe the noise environment. The ABD operations are determined when any total day's operations are at least 50% of the AAD. Thus, the decision to use AAD or ABD is based on the operational tempo of airfield operations at the installation.

The main sources of noise at NAS Oceana are aircraft operations, which include take-offs, landings, touch-and-go operations; interfacility flights between the station and NALF Fentress; and engine maintenance run-ups at the station. These noise sources impact land use on the installation as well as surrounding developed areas that are potentially incompatible with flight operations, such as residential developments, schools, and churches. Aircraft noise was the primary reason for the development of the AICUZ program. Noise studies have been conducted at NAS Oceana to define applicable AICUZ noise exposure zones. These zones provide guidance for promoting compatible surrounding development (see Section 3.1.4).

The aircraft noise analysis for NAS Oceana was originally conducted in 1972 to establish AICUZ boundaries (LANTDIV 1985). These noise studies used the Composite Noise Rating (CNR) Methodology, one of the first techniques developed to measure the effects of aircraft noise on surrounding land uses (LANTDIV 1985). An update to these studies in 1978 used Ldn as the primary noise metric. Both studies used AAD operations as the basis for the noise analyses because they best reflected the daily tempo of airfield operations at NAS Oceana.

The Navy periodically conducts noise studies to assess current noise impacts of aircraft operations. The purpose of these updates is to advise local governments of changes in the noise environment for consideration in local land use planning.

The most recent noise study to determine existing noise exposure contours was conducted for 1997 operations using the NOISEMAP modeling program (Wyle Labs 1997). Derived from airfield operations in the NASMOD study (see Section 3.1.1), this 1997 noise analysis includes operations of F-14 aircraft recently transferred to NAS Oceana. To maintain consistency with past studies, the 1997 study also used the AAD technique to determine the existing noise impact.

A comparison of the existing 1978 AICUZ and 1997 modeled noise contours is presented in Figure 3.1-23. This comparison indicates that the 1997 noise exposure levels are significantly lower than under the existing 1978 AICUZ contours.

In order to estimate the population within the 1978 and 1997 AICUZ noise contours, the contours were overlaid on a Geographic Information System (GIS) database containing population data by block group as reported in the *1990 Census of Population and Housing*. Although the population in the cities of Virginia Beach and Chesapeake has increased by an average of 10% between 1990 and 1996, the 1990 census of population has been used for noise analyses throughout this DEIS to maintain consistency in population data. Table 3.1-35 presents the total area and estimated population within the 1978 AICUZ and 1997 modeled noise contour. Population estimates were calculated by multiplying the area within the contour by the population density of respective block groups reported in the census.

As noted in Table 3.1-35, the number of people exposed to noise levels in excess of 75 Ldn is 1,295 under the 1997 noise contours compared to 42,445 under the 1978 AICUZ. Nevertheless, between 37% and 53% of the population would be highly annoyed at Ldn 75-80. At levels of 75 Ldn, possible noise impacts include intermittent speech interference and occasional sleep disturbance. While there is no potential for permanent hearing loss, nonauditory effects (e.g., hypertension) can begin to occur at Ldn 75 and above (Harris 1996).

3.1.9 Air Quality

3.1.9.1 Air Quality Regulations

The Clean Air Act (CAA) is the primary federal statute governing the control of air pollution. The CAA designates six pollutants as "criteria pollutants," for which National Ambient Air Quality Standards (NAAQS) have been established to protect public health and

Table 3.1-35

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1978 AICUZ AND 1997 NOISE CONTOURS NAS OCEANA/NALF FENTRESS

Ldn	1978 AICUZ		1997 Noise Contours	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	31,214 (12,632)	66,123	13,293 (5,379)	33,545
75 dB or greater	20,361 (8,240)	42,445	4,949 (2,002)	1,295
Total	51,575 (20,872)	108,568	18,242 (7,382)	34,840

Note: Numbers exclude water area.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average sound level.

Source: Wyle Labs 1997.

welfare. These include respirable particulate matter (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead, and ozone (O_3).

The CAA requires states or local air quality control agencies to adopt State Implementation Plans (SIPs) that prescribe measures to eliminate or reduce the severity/number of NAAQS violations and to achieve and maintain attainment of these standards. Areas that do not meet NAAQSs for a criteria pollutant are designated as "nonattainment" for that pollutant. Nonattainment status is further defined by the extent the standard is exceeded. There are six classifications of ozone nonattainment: transitional, marginal, moderate, serious, severe, and extreme; and two classifications of CO and PM_{10} nonattainment status: moderate and serious. The remaining criteria pollutants have designations of either attainment, nonattainment, or unclassifiable. Areas that achieve the air quality standard after being designated nonattainment are redesignated as maintenance areas following EPA approval of a maintenance plan.

NAS Oceana and NALF Fentress are located in the Hampton Roads Intrastate Air Quality Control Region. The air quality in this region is classified as attainment or unclassifiable/attainment for all pollutants except ozone (40 CFR Part 52.2429). For ozone, the region is designated as a marginal nonattainment area, the least severe of the nonattainment designations. Although volatile organic compounds (VOCs) are not considered criteria pollutants and no NAAQS exist for them, they are a major contributor to the formation of

ozone. Also, although only NO_2 is a criteria pollutant with an applicable NAAQS, all oxides of nitrogen (NO_x) are considered to be ozone precursors. Therefore, VOC and NO_x emission sources are regulated in ozone nonattainment areas.

State or local air quality control agencies may petition EPA to demonstrate that a designated nonattainment area now meets NAAQSs for one or more criteria pollutants. Upon review and public comment, these areas are redesignated as "maintenance" areas. As part of the petitioning process, the applicable state or local air quality control agency must prepare a maintenance plan that includes emissions budgets demonstrating measures to be taken to ensure that the area continues to meet NAAQSs.

The Commonwealth of Virginia, through the Virginia Department of Environmental Quality (VDEQ), has petitioned for the Hampton Roads region to be redesignated as an ozone maintenance area and has submitted an ozone maintenance plan to EPA in accordance with the CAA. The VDEQ must use 1993 as the base year for this demonstration, which was the original deadline established by EPA for the region to reach attainment for ozone.

EPA has approved the Hampton Roads redesignation request put forward by VDEQ (FR Volume 62, Number 82, March 12, 1997). The EPA's approval was effective July 28, 1997.

The CAA requires EPA to review scientific data every five years to ensure that established standards for pollutants such as ozone protect public health. As a result of this review, EPA has finalized new, more stringent standards for ozone. Publication of the final rules occurred on July 18, 1997. The effective date of the rule is September 16, 1997. When the proposed revision becomes effective, the designation process based on monitoring data is expected to take up to three years. Revised SIPs would be due three years after designation. EPA can give nonattainment areas up to 10 years with the possibility of two one-year extensions to meet the new standard. A new standard for particulate matter for particles less than or equal to 2.5 micrometers diameter (pm $_{2.5}$) was also issued on July 18, 1997. Before this standard can be implemented, data collection will be required because a limited number of existing monitoring sites measure $pm_{2.5}$.

The CAA also requires promulgation of permit rules and emission standards for certain types and sizes of sources. EPA oversees permit programs for new or modified stationary source construction (New Source Review) and operating permits (Title V).

New Source Review consists of two permit programs. For stationary sources that are to be constructed or modified in attainment areas and that emit pollutants for which the region is designated attainment, the Prevention of Significant Deterioration (PSD) program applies.

For stationary sources that are to be constructed or modified in nonattainment areas and that emit nonattainment pollutants, the nonattainment area permitting program applies.

Emission standards are promulgated by EPA for stationary sources emitting criteria pollutants and for a separate list of sources for hazardous air pollutants. New Source Performance Standards (NSPS) apply to sources emitting criteria pollutants, and National Emission Standards for Hazardous Air Pollutants (NESHAPs) apply to sources emitting certain hazardous compounds.

Virginia recently requested a Title V operating permit application from NAS Oceana. However, in the interim, NAS Oceana continues to operate under four separate air permits for individual sources (i.e., two boiler plant permits, one plastic media blast booth permit, and one peak-load electric generator permit).

3.1.9.2 General Conformity

The CAA, 42 U.S.C. 7476[c], requires federal actions in nonattainment or maintenance areas to conform with an applicable SIP. This provision was added to the CAA by the 1990 amendment. The criteria and procedures to be used to demonstrate conformity are explained in 40 CFR Parts 51 and 93, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (also known as the "General Conformity Rule"). Section 176(c) of the CAA as amended requires conformity analyses in nonattainment or maintenance areas, such as Hampton Roads.

Provisions in the General Conformity Rule allow for exemptions from performing a conformity determination if total emissions of individual nonattainment pollutants resulting from the action fall below specific threshold values (i.e., *de minimis* levels). These values are based on the severity of nonattainment. In Hampton Roads, the marginal ozone nonattainment designation places a 100-ton-per-year (110.2 metric-tons-per-year) threshold value on VOCs and NO_X emissions to determine whether a full conformity analysis is required. These same thresholds apply under the ozone maintenance designation. Stationary source emissions not covered by the new source review program, area source emissions, mobile emission sources, and construction must be considered in the analysis. Any stationary source subject to a new source review program is presumed to conform to the SIP. Its emissions need not be included in a conformity analysis. Employee commuter-related air emissions also need not be included in the analysis if it can be documented that these emissions are included in an approved and conforming transportation improvement plan (TIP).

Emission projections used in general conformity determinations must evaluate the years of maximum direct and indirect emissions, the CAA deadline years for attaining

relevant NAAQSs, and other years specifically used by the applicable SIP documents for tracking anticipated progress toward attainment and maintenance of NAAQSs. For Hampton Roads, the CAA deadline for attaining the ozone standard was November 15, 1993.

For the purposes of general conformity, the proposed action is the decommissioning of older aircraft at NAS Oceana (e.g., A-6 aircraft) and the movement of F/A-18 aircraft to NAS Oceana (under BRAC 1995 mandates) to utilize the excess capacity created by retirement of the A-6 aircraft. VDEQ is using its 1993 emissions inventory as the attainment emissions budget. The Navy is also using 1993 air emissions for existing conditions in this conformity analysis.

The maintenance period commences when EPA approves the Virginia redesignation request. In essence, this event is the starting point for the emission budget in a maintenance plan. Future-year emission budgets are developed and compared to this starting point in order to evaluate the impact of the future year emission budget on the ability to maintain attainment of the standard.

The VDEQ maintenance plan is based on a net reduction of ozone precursor pollutants between the base year (1993 which is also the attainment demonstration year) from all sources in Hampton Roads and future years. VDEQ's 1993 emission database contains input from NAS Oceana's 1993 emission inventory and all other regulated and nonregulated sources in the Hampton Roads air district. The emission inventory proposed by VDEQ for maintaining attainment of the ozone air quality standard contains an emission allotment for NAS Oceana that incorporates growth of ozone precursor emissions from sources at NAS Oceana. The air conformity analysis for the proposed action uses a netting approach to demonstrate SIP conformance based on net emission growth that is within the future growth allotment projected by VDEQ. It is important that the Navy match VDEQ's use of 1993 as the base (or existing condition) year in its conformity analysis. This common base year will assist VDEQ in tracking maintenance of the air quality standard for ozone and conformance with emission allotments within the plan.

3.1.9.3 Existing Emissions at NAS Oceana

A summary of existing emissions at NAS Oceana is presented in Table 3.1-36, and discussed in greater detailed in Appendix E. NAS Oceana generates air pollutant emissions from both stationary and mobile sources. Stationary sources include: boilers, generators, aircraft engine test cells, fuel handling facilities, painting operations, etc. Mobile sources include aircraft, mobile generators, in-aircraft maintenance run-ups, and GSE. However, military aircraft are the primary source of air emissions at NAS Oceana.

Table 3.1-36

AIR EMISSIONS SUMMARY FOR NAS OCEANA AND NALF FENTRESS FOR 1993 (tons per year)

Source Type	1993				
	VOCs	NO_x	CO	SO_2	PM_{10}
NAS Oceana					
Mobile Sources					
Aircraft Operations	272.13	328.88	609.85	18.59	152.58
Other Mobile Sources					
GSE	5.13	26.43	72.65	1.71	2.00
Maintenance Run-ups (In-Frame)	70.29	177.95	130.69	5.82	47.42
Generators	0.56	6.89	1.48	0.45	0.48
Total Mobile & Other Mobile	348.11	540.15	814.67	26.57	202.48
Stationary Sources					
Boilers	1.13	32.32	8.31	22.09	3.84
Generators	0.71	8.67	1.87	0.57	0.61
Engine Testing (Test Cell)	6.24	37.65	49.39	1.80	4.32
JP-5 Fuel Handling	0.66	0.00	0.00	0.00	0.00
Service Station	19.35	0.00	0.00	0.00	0.00
Painting	19.30	0.00	0.00	0.00	0.00
Total Stationary	47.39	78.64	59.57	24.46	8.77
Total NAS Oceana	395.49	618.78	874.24	51.04	211.24
NALF Fentress					
Aircraft	13.50	146.60	37.00	6.81	30.90
Total Annual	408.97	765.41	911.24	57.85	242.11

Note: Shaded columns indicate nonattainment pollutants of concern.
Figures may not add due to rounding.
Aircraft engine VOC emissions reported under aircraft ops, maintenance run-ups, and engine testing are total non-methane hydrocarbons (HC).

A discussion of existing air emissions at NAS Oceana is provided below. This discussion includes a description of the major sources and existing emissions of VOCs and NO_x to facilitate the air conformity determination. Descriptions of existing emissions for other criteria pollutants such as CO, PM_{10}, and SO_2 are also included. No significant sources of lead emissions currently exist at the station.

Aircraft Emissions From Flight Operations

The primary aircraft air pollutant emissions include: VOCs, NO_x, CO, SO_2, and PM_{10}. Aircraft emissions for 1993 were estimated using the methods, emission factors, time-in-mode values for military aircraft, and aircraft engine/model combinations contained in the *Procedures of Emission Inventory Preparation Volume IV: Mobile Sources* (USEPA 1992), and aircraft engine emission rates provided by the Navy's Aircraft Environmental Support Office (U.S. Navy 1990; Coffer 1996). A description of these data is presented in Appendix E. Aircraft operations data detailing the number of operations (e.g., LTO cycles, interfacility operations) per year per aircraft type at NAS Oceana were derived from operations logs maintained by the NAS Oceana Aircraft Operations Department. These operations accounted for annual emissions of approximately 272 tons VOC emissions (reported as hydrocarbon [HC] emissions) and 329 tons of NO_x emissions in 1993. Appendix E presents a discussion of the difference between HC and VOC emissions. These emissions estimates include emissions produced by A-6 flight operations. These aircraft will be decommissioned prior to F/A-18 realignment; therefore, the emissions produced by A-6 operations will not be present in 1999.

Other Mobile Sources

A series of other mobile sources at NAS Oceana contribute to air emissions at the station. These include GSE, engine maintenance run-ups (in-frame engine testing), and mobile generators.

GSE (also known as "yellow gear") include various mobile equipment and vehicles used on the flight line to facilitate aircraft operations. These include tow tractors, start units, and service vehicles. Existing emissions data for GSE were calculated based upon existing operations, fuel logs and emission factors (USEPA 1992). The 1993 emissions of VOCs and NO_x were 5 and 26 tons, respectively.

In-aircraft engine maintenance run-ups are routinely performed prior to and following out-of-frame engine test cell operations. The tests involve running the engine at various

power settings and durations. Maintenance run-ups accounted for 70 tons of VOC emissions and 178 tons of NOx emissions in 1993.

Mobile diesel engine-driven electric generators include portable units that are towed to a location and used to power essential buildings when line power is not available. These generators are used at various locations on base where stationary emergency generators are not available. Emissions for these units were calculated using data from past operations, fuel logs and USEPA emission factors (USEPA 1992). Mobile generators emitted 0.6 ton of VOC and 7 tons of NO_x in 1993.

It should be noted that emissions from personally-owned vehicles (POVs) and government-owned vehicles operating on and off the station were not included in this analysis, because they have already been accounted for in the Hampton Roads TIP. A final Transportation Conformity Determination for this TIP was completed in December 1995 (ICF Kaiser 1995). Therefore, POV emissions are presumed to conform to the Virginia SIP.

Stationary Sources

Stationary source emissions at NAS Oceana include boilers, emergency electric generators permanently installed at buildings/facilities, out-of-frame engine test cells, fuel handling facilities, the NEX service station, and paint spray operations. These emissions were calculated through an examination of operations logs, fuel usage data provided by the NAS Oceana Environmental Compliance Division (Ward 1995b), and USEPA emission factors (USEPA 1995). Stationary sources accounted for 47 tons of VOC emissions and 79 tons of NO_x emissions in 1993.

3.1.9.4 Existing Emissions at NALF Fentress

The main source of air emissions at NALF Fentress is military aircraft operations. The primary function of NALF Fentress is to serve as a site for FCLPs for aircraft based at NAS Oceana; however, it is also used by E-2 and C-2 aircraft from NAS Norfolk. Emissions were calculated using the methods described in Appendix E. Aircraft operations at NALF Fentress accounted for 13 tons of VOC emissions and 147 tons of NO_x emissions in 1993.

3.1.9.5 Total Existing Emissions

Total 1993 emissions for NAS Oceana and NALF Fentress are presented in Table 3.1-36. Total emissions for both facilities are approximately 409 tons per year of VOCs and

765 tons per year of NO_x. CO emissions totaled approximately 911 tons per year, while SO_2 and PM_{10} emissions were approximately 58 and 242 tons per year, respectively.

These emission totals are used as a basis for comparison to the build-out year of the proposed action (1999). The 1993 emission totals include emissions from A-6 aircraft operations and related emissions from maintenance of these aircraft. Decommissioning of these aircraft will cause a decrease in total emissions. This decrease will be used to partially offset the emissions produced by the F/A-18 aircraft. The net increase is within the growth allotment contained in the VDEQ maintenance plan for NAS Oceana.

3.1.10 Topography, Geology, and Soils

3.1.10.1 Topography

NAS Oceana lies within the lower Atlantic Coastal Plain. This area consists of narrow, well-drained ridges; broad, poorly drained flats; and coastal areas (USDA 1988). Topography of the station is relatively flat. The elevation is approximately 5 feet (1.52 meters) above mean sea level (MSL) in drainage ditch areas and approximately 25 feet (7.62) above MSL in open field areas. The elevation in developed areas of the station is 10 to 25 feet (3.04 to 7.62 meters) above MSL (LANTDIV 1993).

3.1.10.2 Geology

The station is underlain by thousands of feet of unconsolidated deposits of gravel, sand, and clay. The age of these deposits range from Lower Cretaceous to Holocene with Precambrian and Triassic/Jurassic bedrock below. The deposits are divided into five geologic units, listed from oldest to youngest: the Patuxent Formation, the Mattaponi Formation, the Calvert Formation, the Yorktown Formation, and the Columbia Group (VWCB 1981).

3.1.10.3 Soils

Acredale urban land complex and Urban land are the two soil types that underlie the proposed construction projects. The following descriptions of these soil types include information on general topographic relief, drainage, erosion hazards, and limitations regarding development. Information on soil types in the project area was obtained from the Soil Survey Report for NAS Oceana (USDA 1988).

The Acredale urban land complex consists of poorly drained Acredale (40%), urban land (35%), and other soils (25%). This relatively level (0 to 2% slope) soil complex is limited by the seasonally high water table, and the slow permeability in the subsoil. Similar

to the Acredale silt loam, the available water capacity for this soil complex is high and the erosion hazard is slight. Urban land areas at NAS Oceana are primarily covered with asphalt, concrete, buildings, or other impervious materials, and the Acredale soils are primarily used for open space, lawns, gardens, and parks (USDA 1988).

Urban land consists of nearly level (0 to 2% slope) areas where more than 80% of the surface is covered by asphalt, concrete, buildings, or other impervious materials. The remaining areas consist of undisturbed soils and Udorthents that are usually located between streets, sidewalks, and yards (USDA 1988).

3.1.11 Water Resources

3.1.11.1 Surface Water

NAS Oceana lies within the coastal plain physiographic province, and spans two drainage basins: The Chesapeake Bay/Small Coastal Rivers Basin and the Chowan River/Dismal Swamp Basin (VWCB 1992). The northern, sparsely developed portion of the station is located within the Chesapeake Bay/Small Coastal Rivers Basin, while the more intensively developed area south of the airstrips lies within the Chowan River/Dismal Swamp Basin.

Extensive ditching and modification of natural drainage patterns has occurred throughout NAS Oceana (LANTDIV 1985). Surface water is directed into a network of drainage ditches, and exits NAS Oceana at several points on the north, west, and south boundaries of the property. Two proposed construction project sites, the Aircraft Acoustical Enclosure and the F/A-18 Flight Simulator Building Addition to Building 140 are located close to existing drainage ditches. USACE made jurisdictional determinations at each of these sites. In both cases, the drainage ditches were not determined to be waters of the United States regulated under the Clean Water Act.

In general, drainage from the northernmost portion of NAS Oceana flows northward into the Chesapeake Bay via Wolfsnare, London Bridge, and Great Neck creeks. Drainage from most of the remainder of the station, including the majority of the developed areas and all of the proposed project sites, is directed into the station's main drainage canal. This major drainage flows southward and discharges into West Neck Creek. West Neck Creek is a tributary of the North Landing River, which flows southward to Currituck Sound and ultimately converges with the Atlantic Ocean at the barrier island coast of North Carolina. The North Landing River and the Northwest River together comprise 250 square miles (650 square kilometers) of drainage area, all draining eventually into Currituck Sound (VWCB 1992).

All water bodies in the Commonwealth of Virginia are designated for recreational use and for the propagation and growth of a balanced, indigenous population of fish and wildlife (Commonwealth of Virginia 1991). These two uses are consistent with the goals of the Clean Water Act (CWA) for swimmable and fishable waters. A series of seven classes and their associated numeric water quality standards have been established for monitoring the protection of these uses. West Neck Creek, as a tributary of the North Landing River, carries the same water quality classifications and standards as assigned to this river. The VDEQ has designated the North Landing River and its free-flowing tributaries as Class III waters. Class III waters are nontidal (fresh) waters where quality standards for dissolved oxygen (minimum = 4.0 milligrams per liter [mg/l]/daily average = 5.0 mg/l), pH (allowable range = 6.0 - 9.0), and temperature (maximum 32°C) apply.

North Landing River and West Neck Creek are not used as public water supply sources and are not designated as trout streams or scenic rivers (Commonwealth of Virginia 1991). In addition, no contamination or fishing advisories have been identified (Fults 1994). Monthly ambient water quality monitoring is conducted by VDEQ at four points along the North Landing River System. Two of these monitoring stations are located in West Neck Creek. The creek monitoring station closest to NAS Oceana is located approximately 4.5 miles (7 kilometers) south of the installation. From 1989 to 1991, these stations have exhibited no water quality violations for temperature, pH, fecal coliform bacteria, and dissolved oxygen (VWCB 1992). For the entire North Landing River System, which covers 68.5 river miles of surface water, the swimmable goal is fully supported. The fishable goal for this water body is fully supported for 66.5 miles (107 kilometers) and only partially supported for 2.0 miles (3.2 kilometers) (VWCB 1992).

Industrial stormwater discharges through ditches, channels, or other conveyances (point sources) are regulated by the VPDES program, administered by the VDEQ. Among the activities requiring VPDES permitting, stormwater discharges associated with industrial activities are regulated. Industrial activities include construction activities (including clearing, grading, and excavation) disturbing 5 or more acres (2 or more hectares). NAS Oceana is currently permitted under VPDES Stormwater Discharge Permit No. VA0005266.

Water quality at four external points and three internal points at NAS Oceana is monitored by NAS Oceana personnel and reviewed by VDEQ. Exceedance of permit limits for oil and grease and pH has occurred intermittently in the past (Loop 1993; Thompson 1994).

A floodplain study conducted in 1972 by the U.S. Army Corps of Engineers, Norfolk District, for the City of Virginia Beach established flood levels for the region including NAS

Oceana. The only 100-year floodplain present at the station is associated with Great Neck Creek in the northern portion of the installation (LANTDIV 1985). The proposed project areas are a minimum of 1 mile (1.6 kilometers) away from floodplain areas.

3.1.11.2 Groundwater

NAS Oceana overlays four major aquifers including the water table, the Yorktown aquifer, the Eocene-Upper Cretaceous aquifer, and the Lower Cretaceous aquifer. These aquifers are found at depths ranging from 0 to 40 feet (12.2 meters), 50 to 150 feet (15.2 to 45.7 meters), 500 to 1,000 feet (152.4 to 305 meters), and 600 to 800 feet (183 to 244 meters), respectively.

The water table aquifer consists of beds and lenses of sand and some gravel, shell beds, silt, sandy clay and clay, and supplies water mostly for lawn watering or other non-potable water uses. The flow of groundwater through this aquifer is dictated by the topography of the area or from higher altitudes (inland areas) to lower altitudes (coastal areas). Due to the high iron and acidic content of the water within the water table, the state health department does not allow use of water from this aquifer for public water supplies.

Underlying the water table aquifer is the Yorktown aquifer, which can supply large quantities of potable water. The flow of groundwater through this aquifer is similar to the water table aquifer. The Eocene-Upper Cretaceous and Lower Cretaceous aquifers underlay the Yorktown aquifer. The Cretaceous aquifers are used primarily for industrial water supplies because the water is mostly brackish; however, there are sections of the Lower Cretaceous aquifer that can supply potable water. Groundwater within these aquifers generally flows to the west (VWCB 1981).

NAS Oceana operates seven wells on the station property: three wells are used to supply water for irrigation of the golf course, one active well is used for the washing of vehicles, and three wells are used to supply nonpotable water to bathrooms at the back gate guardhouse and two outdoor recreational areas. These wells tap the water table aquifer.

3.1.11.3 Wetlands

A station-wide wetlands inventory for NAS Oceana has been conducted (LANTDIV 1993). This inventory was based on examination of United States Fish and Wildlife Service (USFWS) National Wetlands Inventory Maps, interpretation of aerial photography, and field survey. According to this inventory, one proposed construction site at NAS Oceana, the proposed parking apron expansion, contains wetland areas.

Wetland surveys were conducted in 1997 at the proposed aircraft hangar and parking apron expansion sites. National Wetland Inventory (NWI) maps indicate the presence of a large palustrine forested and scrub-shrub complex in this area. Survey results indicate only the presence of a small (approximately 0.3 acre) palustrine emergent/palustrine scrub-shrub (PEM/PSS) wetland in the project area. This wetland lies between the proposed parking apron expansion area and the existing runway. Figure 3.1-24 identifies the mapped NWI wetlands and the field-delineated wetland in relation to the proposed new aircraft hangar and parking apron expansion areas.

The wetlands identified on the NWI maps have been significantly altered and no longer meet wetland criteria for vegetation, soils, and hydrology. Historically, the area was likely a wetland, as evidenced by the presence of hydric soils. However, the area has been heavily ditched, which is likely a result of historic farming activities in the area. This hypothesis is supported by the presence of more mature trees along the ditches and roadways, the presence of much younger secondary successional species (red maple and sweet gum) in the intermediate areas between the ditches, and a fairly homogenous soil profile indicative of plowing activities. The extensive woody growth in the project area indicates that agricultural activities have been abandoned for some time.

The ditches across the project area have altered the hydrology in the area. Presently, three large maintained ditches and approximately five smaller ditches are located in the proposed project area (see Figure 3.1-24). The three larger ditches are excavated to a depth of approximately 6 feet with the smaller ditches excavated only 1 to 2 feet. These ditches would likely be classified as nonjurisdictional, as they still function as drainage ditches. A survey of the bank vegetation along these ditches indicates that water does not overflow the banks even at times of high flow. At the time of the survey, the large ditches exhibited only minor flow, and the smaller ditches had no flow. Additionally, the development of an organic leaf-litter horizon overlying the hydric soil indicates that the area is not inundated for long periods of time.

The single wetland identified adjacent to the project area is essentially a drainage swale extending from an existing taxiway area immediately to the northwest and continuing southeast for approximately 490 feet (150 meters) where it eventually dissipates. In one area, the drainage is culverted under a dirt road that crosses the southeast portion of the wetland.

Hydrology indicators evident in the wetland include soil saturation in the upper 12 inches, water marks, drift lines, sediment deposits, drainage patterns, and water-stained leaves. Hydrophytic vegetation occurring within the wetland includes red maple (*Acer rubrum*), wax myrtle (*Myrica cerifera*), large sedge (*Carex gigantea*), soft rush (*Juncus*

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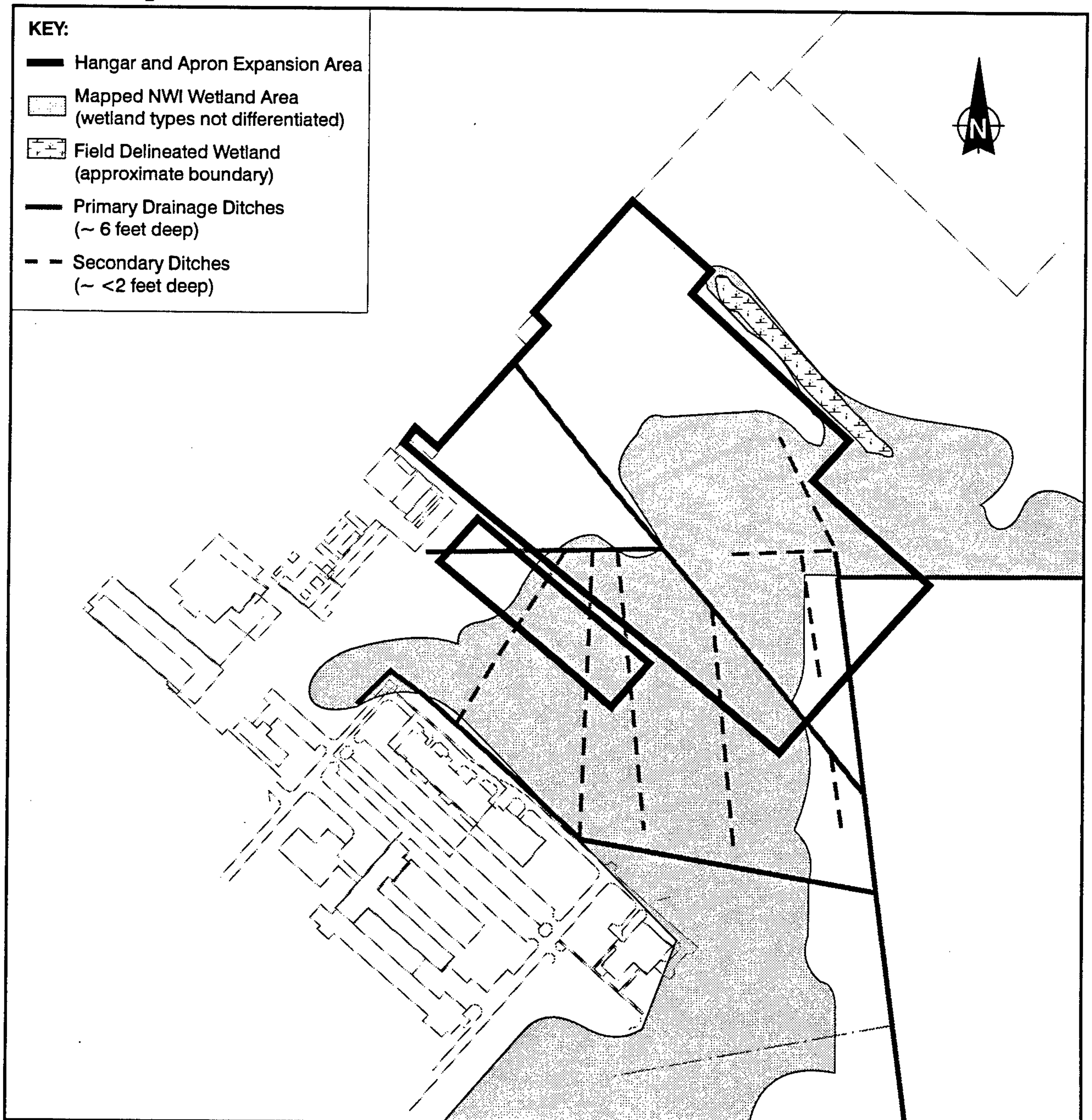

SOURCE: LANTDIV 1985; USFWS 1990

SCALE

0 260 520 Feet

0 79.25 158.5 Meters

Figure 3.1-24 USFWS-MAPPED WETLAND AND FIELD DELINEATED WETLANDS ASSOCIATED WITH HANGAR AND APRON EXPANSION PROJECTS AT NAS OCEANA

effusus), wool-grass (*Scirpus cyperinus*), smartweed (*Polygonum sp.*), and trumpet-creeper (*Campsis radicans*). Soils are characteristic of hydric Acredale soils, which are prevalent throughout the area.

3.1.12 Terrestrial Environment

3.1.12.1 Vegetation

A wide variety of plants and plant associations (cover types) occur throughout NAS Oceana, and are influenced by the degree of human disturbance and/or maintenance activities (see Figure 3.1-25). For example, maintenance practices on the station range from intensive management of its golf course and landscaped areas, to minimal or no disturbance in mature forested areas. In addition, a portion of the base is leased for agricultural and grazing use. Other vegetated areas receiving moderate-to-high levels of maintenance include the station's existing athletic fields, areas adjacent to the airfield runways and taxiways, and developed areas near residential quarters and operations buildings. Some forested areas at the station have been harvested for timber in the past, but current market values have reduced the desirability of this practice. Currently, the Navy manages the natural areas at the station for biodiversity rather than timber harvesting (Hostetter 1993).

A large percentage of NAS Oceana consists of areas developed with buildings and pavement (38%) and forested areas (27%). Agricultural land comprises 18% of the total acreage, while outdoor recreational areas and wildlife food plots may be found on 9% and 8% of the base, respectively. The existing vegetation within the proposed project areas is described below.

Parking Apron Alterations

All construction activities associated with these proposed alterations would be located entirely on existing paved areas.

F/A-18 Flight Simulator Building

The proposed building addition located to the northwest of the existing building is primarily characterized as a maintained (mowed/cut) lawn area. This lawn consists of planted grasses including Kentucky 31 tall fescue (*Festuca arundinacea*) and Bermuda grass (*Cynodon dactylon*) intermixed with annual grasses and broadleaved herbaceous vegetation such as clovers (*Trifolium spp.*) (LANTDIV 1988a). In addition, two mature loblolly pine (*Pinus

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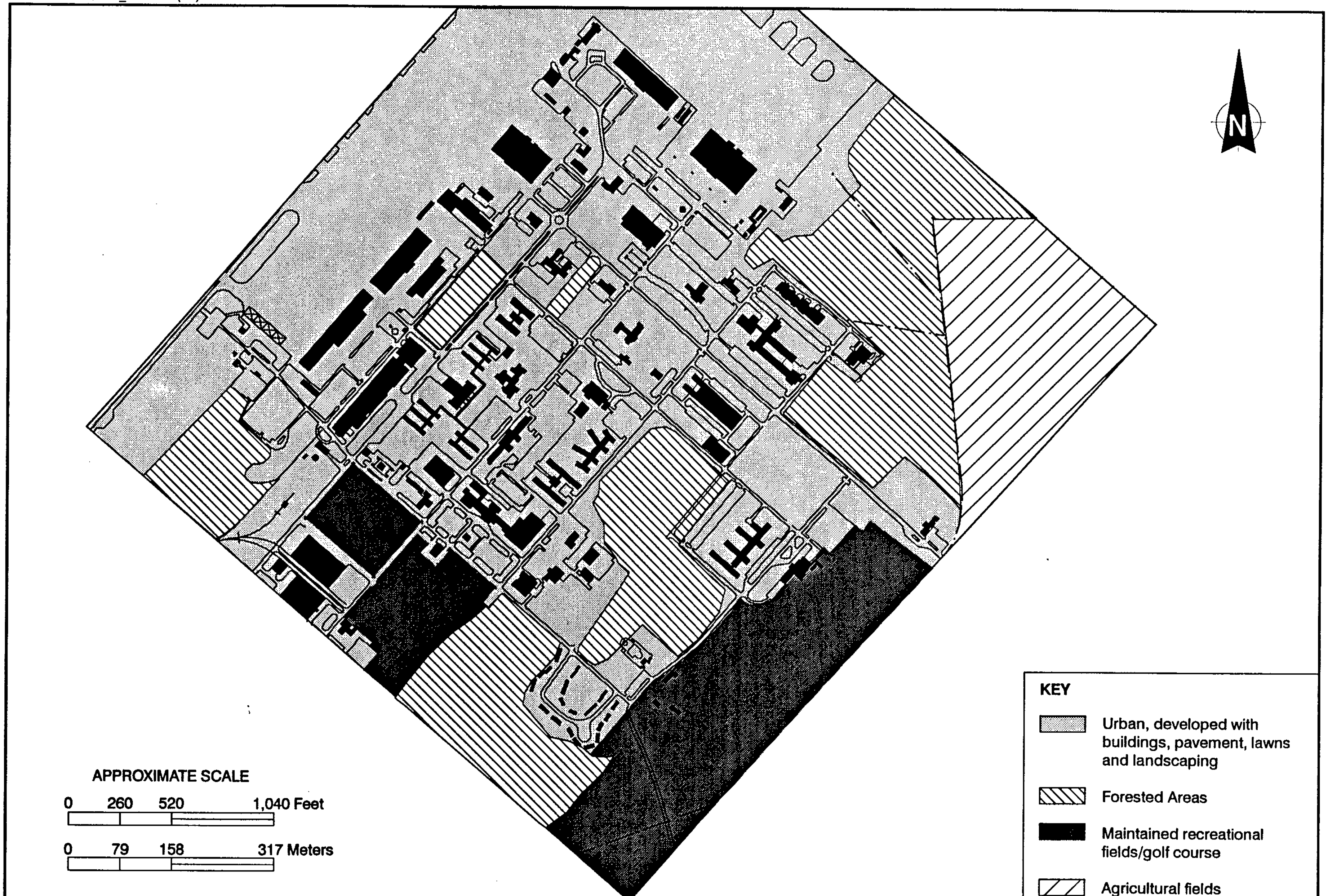

SOURCE: LANTDIV 1993; 1985.

Figure 3.1-25 GENERAL PATTERNS OF VEGETATION PRESENT AT NAS OCEANA IN AREAS OF PROPOSED CONSTRUCTION

taeda) trees with an average diameter at breast height (dbh) of 20 inches, and two sweetgum (*Liquidambar styraciflua*) trees with an average dbh of 18 inches are found in this area.

The proposed building addition located on the southwestern side of the existing building consists of a paved parking lot, a narrow (approximately 10-foot-wide) strip of maintained lawn, and three planted 8-foot tall loblolly pines. The species composition of the planted lawn is the same as that described above.

The remaining construction activities associated with these additions consist of interior renovations in Building 140.

NAMTRAGRUDET Training Facility Renovations/Additions

The proposed site for construction of the new building addition is characterized as a maintained lawn area, dominated by grass species normally planted on NAS Oceana's improved areas, as described previously. One very large southern red oak (*Quercus falcata*) tree with a dbh of 41 inches is located near the southeast corner of the proposed construction area. The remaining construction activities associated with this area consist of interior renovations in Buildings 240 and 223.

Strike Fighter Weapons School Additions and Parking

There are three proposed additions to existing Building 137. One would be located at the northwest corner of the building and would consist of a paved parking lot and maintained lawn area. The other two proposed construction sites located along the southwestern and southeastern sides of the existing building are both characterized as maintained lawn areas. Species present in these lawn areas are those normally planted on NAS Oceana's improved areas, as described previously. No trees or shrubs are located in any of the three proposed construction sites.

The parking area associated with these proposed building additions is located adjacent to the southwestern side of the existing parking lot. This area consists of a maintained lawn and 16 large trees. The lawn area includes those grass species common to improved areas at NAS Oceana, as described previously. The trees include four sweetgum, five black oak (*Quercus velutina*), and five laurel oak (*Quercus laurifolia*) trees which have an average dbh of 22 inches; one 24-inch dbh loblolly pine; and, one 20-inch dbh swamp chestnut oak (*Quercus michauxii*).

Corrosion Control Hangar

The area located immediately adjacent to the site consists of pavement, mowed grass/ maintained lawn, goldenrod, pokeweed (*Phytolacca americana*), berries (*Rubus spp.*), and winged sumac (*Rhus coppallina*). Also located along the existing fence line is a small drainage ditch that is vegetated with cattails (*Typha spp.*), rushes (*Scirpus spp.*), switch cane, mints (*Mentha spp.*), and groundsel-tree (*Baccharis halimifolia*). There was no water observed in this 4-foot-wide ditch at the time of the field survey. Adjacent to the south side of this ditch is an approximately 10-foot-wide tree line that is densely vegetated with sweetgum, loblolly pine, black cherry (*Prunus serotina*), and common waxmyrtle (*Myrica cerifera*). The remaining proposed construction area consists of an open field that includes various grasses, thistle (*Cirsium spp.*), goldenrod, trumpet creeper (*Campsis radicans*), partridge pea (*Cassia fasciculata*), bush clovers (*Lespedeza spp.*), and winged sumac seedlings.

F/A-18 Aviation Maintenance Additions and Parking

There are nine proposed construction sites associated with these additions. The proposed construction site located at the southeastern corner of existing Building 301 would be entirely located in a paved area. The proposed construction site located along the northeastern end of Building 401 would also be located in a paved area. Similarly, the proposed site located along the southern edge of the parking lot for Building 401 would be located on a paved area. The small proposed construction site located near the northeastern corner of the parking lot for Building 401 is characterized as a maintained lawn area consisting of planted grasses (see F/A-18 Simulator Building area description).

Located across the street from Building 401, in an entirely forested area, is the proposed sites for a new parking lot and a freestanding building for armament storage. This forested area is isolated from other forested areas at NAS Oceana, and is surrounded by buildings, road, and parking lots. The overstory consists of yellow poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), sweetgum, and red maple (*Acer rubrum*) trees with the average dbh ranging between 20 and 30 inches. The moderately dense understory includes pawpaw (*Asimina sp.*), black cherry, ironwood (*Carpinus caroliniana*), beech, red maple, greenbrier (*Smilax sp.*), and sassafras (*Sassfras albidum*). The herbaceous layer is sparsely vegetated with patches of switch cane (*Arundinaria gigantea*).

There is one small proposed construction site associated with an addition to Building 513. This proposed site would be located on the northwestern side of the building in a

maintained lawn area that has three small (approximate 4-inch dbh) planted silver maple (*Acer saccharinum*) trees.

The proposed construction site for a new parking lot located along 5th Avenue near Building 607 is characterized as a maintained lawn area. One 26-inch dbh sweetgum tree is located in the northeast corner, and the remaining vegetation consists of planted grass species common to NAS Oceana.

Bachelor Enlisted Quarters

The proposed site for the BEQ is a portion of an entirely forested area, currently used as a recreational area. Similar to the site for the Building 401 parking lot, this area is isolated from other forested areas at NAS Oceana, and is surrounded by buildings, road, and parking lots. The overstory consists of loblolly pine, sweetgum, and red maple trees with the average dbh ranging between 12 and 14 inches, while the understory is almost completely open. There is almost no herbaceous growth on the site with the exception of vegetation occurring along the edge of an existing steam line that passes along the northwest portion of the site. These areas are sparsely vegetated with pokeweed and switch cane.

Aircraft Acoustical Enclosure

The proposed site for the aircraft acoustical enclosure extends approximately 240 feet (73 meters) southwest from the aircraft high power turn up area near the end of Runway 5R. This site is characterized as a combination of open field (i.e., mowed) and forest area. Open field areas extend roughly the first 90 feet (27 meters) from the turn up area pavement. This area consists of various grasses, thistle, goldenrod, trumpet creeper, partridge pea, and bush clovers. From this point, the site is characterized as a forested area. The overstory consists primarily of chestnut oak, loblolly pine, yellow poplar, and willow oak. The understory consists of pawpaw, greenbrier, ironwood, red maple, and sweetgum. The herbaceous layer is sparsely vegetated with patches of switch cane.

Jet Engine Test Cell Replacement, Installation of Secure Vaults, and Building 122 Renovations

All construction activities associated with these proposed projects would be located entirely on existing paved areas.

Aircraft Hangar and Parking Apron Expansion

The area of the proposed new aircraft hangar and parking apron expansion consists of several different cover types including mowed grassy areas, successional shrubby areas, successional forested areas, and mature forested areas. The grassy areas are dominated by grass species normally planted in NAS Oceana's improved areas as well as various wild grasses, thistle, and goldenrod. These areas are mowed and maintained due to their proximity to the existing parking apron and taxiway. The successional shrubby areas are characterized by dense woody growth with little or no overstory. These areas have a dense vine layer, inclusive of Virginia creeper (*Parthenocissus quinquefolia*), greenbriar, and japanese honeysuckle (*Lonicera japonica*); a dense understory of common privet (*Ligustrum vulgare)* and wax myrtle; and a sparse overstory of sweet gum and red maple. The successional forested area consists of mature cherry, hickory, loblolly pine, and oak trees along the existing drainage ditches; successional red maple, sweet gum, and eastern red cedar in the understory; and a dense groundstory consisting mostly of giant cane. This area is a highly-disturbed reverting farm field, which was cleared at one time and heavily ditched to facilitate drainage of the area. The mature forested area consists of a developed overstory, heavily populated with oak climax species; a fairly open understory (mostly wax myrtle); and a sparse groundstory consisting of poison ivy, virginia creeper, cat greenbriar, and giant cane. This area is less disturbed then the successional forested areas.

3.1.12.2 Wildlife

The maintained lawns and developed areas located throughout NAS Oceana and around the existing buildings are considered of minor wildlife value and ecological importance. Because of the lack of vegetative diversity and density, these areas do not provide the essential resources (i.e., cover/shelter, food, and water) necessary to support an abundance or diversity of wildlife species. Therefore, only those wildlife species tolerant of human activity and/or disturbances are likely to occur in these areas. In addition, based on the general size of these species' ranges and their food requirements, these areas are only capable of supporting a few individuals of a population at any given time. A few of the species observed in the maintained and developed areas during field surveys include the house sparrow (*Passer domesticus*), starling (*Sturnus vulgaris*), robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), bluejay (*Cyanocitta cristata*), gray squirrel (*Sciurus carolinensis*), and eastern cottontail (*Sylvilagus floridanus*).

The proposed aviation maintenance parking area and armament storage building sites that are located across the street from Building 401, the aircraft hangar and parking apron expansion site, the proposed BEQ site, and a portion of the aircraft acoustical enclosure site would be situated in areas that have not been significantly disturbed or developed. These sites are located in forested areas (i.e., woodlots) that are considered of moderate wildlife value and ecological importance. Based on aerial photographs of NAS Oceana, there is an overall lack of forested areas, or similar habitat, throughout the base. Therefore, these urban forested areas provide a variety of woodland species with the cover/shelter and food required to survive. Notwithstanding, the small size of these woodlots and the lack of travel corridors throughout the base limits the diversity and abundance of wildlife species in these areas. A few of the bird species likely to occur in these forested areas include the northern flicker (*Colaptes auratus*), great crested flycatcher (*Myriarchus crinitus*), eastern screech owl (*Otus asio*), American crow (*Corvus brachyrhynchos*), carolina wren (*Thryothorus ludovicianus*), northern bobwhite (*Colinus virginianus*), and northern mockingbird (*Mimus polyglottos*). Some of the mammalian species likely to occur in these forested areas include the raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), little brown bat (*Myotis lucifugus*), and white-tailed deer (*Odocoileus virginianus*). In addition, these forested areas provide cover/ shelter for some of the previously mentioned species adapted to maintained lawn and developed areas at the station.

3.1.12.3 Threatened and Endangered Species

An inventory of rare, threatened, and endangered plant and animal species was performed for NAS Oceana by the Virginia Department of Conservation and Recreation (VDCR) in 1990. The survey found no listed threatened or endangered plant or animal species, and only one rare species at the base. A community of southern twayblade (*Listera australis*), a rare perennial orchid, was found within the former NAS Oceana mini-bike park. This species occurs in woodlands exhibiting some form of past disturbance. Rare species are not currently protected by any state or federal legislation/regulations. VDCR also recommended that four "special interest" areas be set aside as botanical or ecological reserve areas, for the preservation of potential rare species habitat: the Northwest Woods Area, the Sand Pits Area, the Owl Creek Area, and the Old Woods Area (VDCR 1990a). None of the proposed construction sites are located within these special interest areas.

VDCR also completed an inventory of rare, threatened, and endangered species for NALF Fentress in 1990 (VDCR 1990b). The survey found one federal candidate animal specie, one state endangered reptile specie, and one rare plant species at NALF Fentress. The

Dismal Swamp bog lemming (*Synaptomys cooperi helaletes*), a federal candidate specie, was encountered near the southwestern end of the NALF Fentress runway. The state-endangered canebrake rattlesnake (*Crotalus horridus atricaudatus*) was found near a storage building at NALF Fentress. Finally, a state rare plant specie, the silky camellia (*Stewartia malacodendron*), a deciduous shrub, was found disbursed over 10 acres southwest of the end of the NALF Fentress runway near Pocaty Creek. VDCR also recommended that three special interest areas be set aside as botanical or ecological reserve areas, for the preservation of potential rare species habitat: the Pocaty Creek Area, the "Tip-of-the-Runway" Area, and the North Landing Swamp Area.

The USFWS, Virginia Department of Game and Inland Fisheries (VDGIF), Division of Natural Heritage/Wildlife, VDCR Division of Natural Heritage, and Virginia Department of Agriculture (VDA) were contacted for updated information regarding the presence/absence of listed species of concern, as well as ecologically significant natural communities located in the general vicinity of the proposed project.

The USFWS has indicated that no federally-listed, proposed, or candidate species have been documented at the proposed project sites. However, the Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) and Virginia least trillium (*Trillium pusillum* var. *virginianum*) have been documented within a 1-mile (1.6 kilometer) radius of the project sites (Mayne 1995). The VDCR has indicated that the southern twayblade (rare perennial orchid) and red-mantled glider (rare dragonfly) occur on NAS Oceana; and, that the Dismal Swamp southeastern shrew and Virginia least trillium have been documented to the south of NAS Oceana. In addition, the VDCR commented that the special interest areas previously discussed are located within the general vicinity of the proposed projects (Berlinghoff 1995). The VDA has indicated that no state- or federally listed plant or insect species are known to occur in the proposed project areas (Tate 1995). The VDGIF Division of Wildlife has no documented occurrences of threatened or endangered species in the proposed project areas. However, VDGIF restated that the endangered canebrake rattlesnake and Dismal Swamp southeastern shrew have been documented within a few miles of the station, and that the state special concern great egret (*Casmerodius albus egretta*), state-endangered eastern chicken turtle (*Deirochelys retiularia*), and state-threatened Mabee's salamander (*Ambystoma mabeei*) and barking treefrog (*Hyla gratiosa*) may potentially occur in the proposed project areas if suitable habitat exists (Hultz 1995).

3.1.13 Cultural Resources

3.1.13.1 Archaeological Resources

Archaeological investigations of prehistoric cultural resources in Virginia have resulted in the recognition of three major cultural stages. These stages are known as Paleo-Indian (10,000 to 8,000 B.C.), Archaic (8,000 to 1,000 B.C.), and Woodland (1,000 B.C. to A.D. 1,600) (Hodges 1981). These periods are characterized by different subsistence strategies, settlement patterns, technology, and artifact inventories.

Prehistorically, the area of NAS Oceana would have offered a variety of water and terrestrial resources. Such a setting would have been attractive to the prehistoric inhabitants of the region.

European colonization of Virginia began in 1607 with the establishment of Jamestown. By late 1620, the English settlement extended into the southeastern portion of the state. Princess Anne County was formed in 1691. Settlement in this county included a number of large successful tobacco plantations, concentrated along the Lynnhaven, Elizabeth, and North Landing rivers. The settlement in the southern portion of Princess Anne County was more infrequent and farms tended to be small. Tobacco remained the primary crop throughout the 18th century, although flax, wheat, and other grains were also grown. Industrial activities were restricted primarily to operation of gristmills and tanneries (E & E 1996).

Historic use of the NAS Oceana area originally followed the routes of the major waterways. Road development began as early as the 17th century and continued into the 20th century as the growing need for private and commercial transportation evolved. The settlement pattern of this area occurred in association with these waterways and the developing road system (R. Christopher Goodwin and Associates 1993).

The military tenure at NAS Oceana began in 1940, when the Navy purchased 329 acres to establish an auxiliary air station (R. Christopher Goodwin and Associates 1993). The facility continued to grow and expand throughout World War II becoming the Navy's first jet airfield in 1952 (Shettle 1995). Currently, NAS Oceana consists of over 5,000 acres, and construction and development of the facility has continued up to the present.

R. Christopher Goodwin and Associates, Inc., conducted extensive archival research and archaeological investigations at NAS Oceana (R. Christopher Goodwin and Associates 1995). According to this research, 22 archaeological sites are known to exist within 2 miles of NAS Oceana beyond the station boundaries. Twenty-eight sites have been identified within the bounds of the facility. These included four prehistoric, 20 historic, and four multiple component sites. Prehistoric sites were found in association with the sand ridge (relict barrier island), which runs along the eastern boundary of the station. Historic sites were found along

the 19th and 20th century road network. The investigation also indicated extensive surficial disturbance of various portions of the facility (R. Christopher Goodwin and Associates 1995).

3.1.13.2 Architectural Resources

The Virginia Department of Historic Resources (VDHR), the designated State Historic Preservation Office (SHPO) in the Commonwealth of Virginia, was consulted to determine whether buildings to be affected by the proposed construction projects were eligible for inclusion in the National Register of Historic Places (NRHP) (Hilliard 1995). Of particular concern was whether the buildings to be affected were significant in the context of World War II or the Cold War periods. VDHR determined that these buildings do not meet NRHP eligibility criteria (Dutton 1995).

In the vicinity of the station, there is one structure listed on the NRHP, the Upper Wolfsnare Plantation (VDHR File No. 134-34). This structure, a plantation house constructed in 1759, is located directly north of the station on Potters Road. In 1788, the structure was owned by Thomas Walke IV, one of the Virginia ratifiers of the United States Constitution. The structure and the lot on which it stands is also designated as a local historic district by the City of Virginia Beach.

3.1.14 Environmental Contamination

3.1.14.1 Hazardous Materials and Waste Management

The Station Consolidated Hazardous Materials Re-Utilization and Inventory Management Program (SCHRIMP) is responsible for managing the hazardous wastes generated at NAS Oceana. NAS Oceana is a large quantity generator of hazardous waste. For calendar year 1995, the station generated a total of 70 tons of Resource Conservation and Recovery Act (RCRA)-regulated hazardous waste and 200 tons of non-RCRA regulated waste (special waste).

NAS Oceana has a RCRA Part B permit which limits the volume of hazardous waste generated and stored at the station. Hazardous wastes are stored in two buildings: one with an allowable capacity of 3,520 gallons, the other 10,560.

3.1.14.2 Installation Restoration Program Sites

According to the RCRA Facility Investigation (RFI) for NAS Oceana, there are 17 known Solid Waste Management Units (SWMUs) at the station (CH2M Hill 1993). These areas each exhibit varying degrees of contamination resulting from past industrial activities,

and are undergoing further investigation and remediation. SWMU 2C is in the vicinity of a portion of the proposed F/A-18 Aviation Maintenance Facilities; SWMU 2B is near the site of the proposed Apron Expansion, New Hangar, Corrosion Control Hangar and Strike Fighter Weapons School Facilities (see Figure 3.1-26).

SWMU 2C, which is in the area of Line Shack Building 400 and Buildings 301, 401, 404, 419, 420, 412, and 422, has been used for aircraft maintenance and cleaning. Waste disposal in the area of these buildings began in 1963 and continued until 1981 when a hazardous waste collection and recycling program began at the station. Materials disposed of include: waste oils, hydraulic fluids, paint strippers, thinners, and engine cleaners (CH2M Hill 1993).

In addition to the RFI final report (CH2M Hill 1995), other environmental investigations of the areas surrounding these buildings include an Interim RFI in 1990 and a Line Shack Inspection Study in 1988. Benzene, toluene, ethylbenzene, and xylenes (BTEX), vinyl chloride, and 1,2-dichloroethylene (1,2-DCE) were detected in the soil, but are confined to the southeastern corner of Building 301.

A series of shallow and deep monitoring wells have been installed at SWMU 2C. Samples collected from the wells indicated that the groundwater is contaminated with volatile organic compounds (VOCs) (CH2M Hill 1993; 1995). The groundwater near Building 400 and south of B Avenue in a wooded area (i.e., proposed parking area site) is contaminated with chlorinated hydrocarbon compounds. The compounds detected in the highest concentrations included 1,1-dichloroethane (1,1-DCA), cis-1,2-dichloroethylene (cis-1,2-DCE), trichloroethylene (TCE), and vinyl chloride. The levels of TCE, vinyl chloride, and cis-1,2-DCE detected were above the federal Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs). The area of highest groundwater contamination was 100 to 1,000 feet south of Buildings 301 and 306 (CH2M Hill 1993).

A Corrective Measures Study (CMS) was performed to evaluate four remedial measures for groundwater contamination at SWMU 2C. The preferred alternative involves groundwater containment and source area extraction with treatment air stripping. After reviewing EPA's Vendor Information System for Innovative Treatment Technologies, two in-well remediation technologies were identified for remediating groundwater specifically for SWMU 24, another of the 17 SWMUs. A pilot test is being conducted for the NoVOCs well system offered by EG&G Environmental, Inc. This in situ system does not require ex situ treatment of groundwater, thereby saving the associated water treatment costs. Final selection

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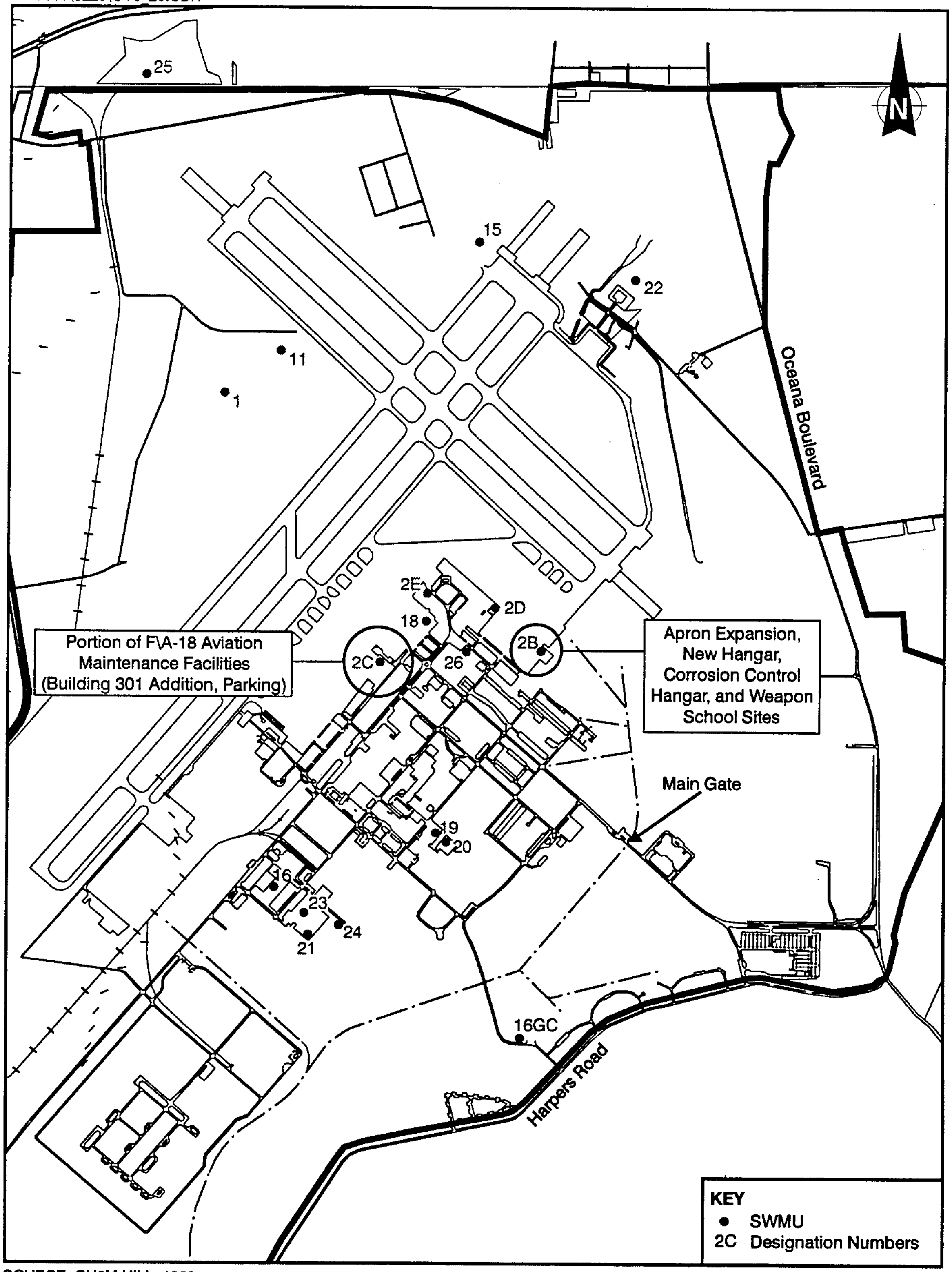

SOURCE: CH2M HILL, 1993

SCALE

0 743 1,486 Feet

0 453 906 Meters

Figure 3.1-26 SOLID WASTE MANAGEMENT UNIT (SWMU) LOCATIONS AT NAS OCEANA

of a remedial technology for SWMU 2C will depend on the outcome of the pilot test. If the test is successful, this technology will be considered for SWMU 2C.

SWMU 2B, which includes the Line Shack Buildings 130-131 Disposal Area, is located southeast of the main Hangar 122 and encompasses the areas for the proposed Apron Expansion, New Hangar, Corrosion Control Hangar and Weapon School sites. Waste oils and aircraft-maintenance chemicals were disposed of in the area from 1963 until the hazardous waste collection and recycling program was implemented. Materials disposed of include: oils, hydraulic fluids, turco, paint strippers, and aromatic hydrocarbons (CH2M Hill 1993).

This area has been evaluated in four environmental investigations: Round 1 Verification Step in 1986, the Line Shack Inspection Study in 1988, the Interim RFI in 1990, and the CMS in 1995. The sampling results of the investigations indicate that the groundwater contains elevated concentrations of chlorinated organics such as: vinyl chloride, benzene, TCE, cis-1,2-DCE, 1,2,DCA, toluene, and total xylenes. The levels of vinyl chloride, TCE, cis-1,2-DCE, and 1,2-DCA exceed the federal SDWA MCLs. Seven PAHs were detected in sediment samples and the concentrations exceeded NOAA guidelines. In addition, two of the seven PAHs detected would exceed sediment criteria proposed by the EPA (CH2M Hill 1993). None of the soil samples collected as part of the CMS contained chlorinated VOCs, but several samples had trace amounts of BTEX compounds (CH2M Hill 1995).

Three remedial measures for groundwater contamination at SWMU 2B were evaluated in the CMS. The selected alternative is the same as for SWMU 2C; however, the final remedial technology may be revised pending the outcome of the pilot study of the in situ treatment system being conducted for SWMU 24. In addition, natural attenuation is being investigated as a possible solution.

3.2 Affected Environment at MCAS Beaufort

3.2.1 Airfield Operations

MCAS Beaufort has two runways for arrival and departure air traffic: Runway 5/23, which is 12,200 feet (3,697 meters) long and 200 feet (61 meters) wide; and Runway 14/32, which is 8,000 feet (2,424 meters) long and 200 feet (61 meters) wide (see Figure 3.2-1). Runway 5/23 receives about 80% of air operations at the installation. Support facilities for Marine F/A-18 aircraft, support aircraft, and transient aircraft such as hangar space, fuel pits, and aircraft parking areas are located south of these runways (SOUTHDIV 1994).

The MCAS Beaufort Tower provides all air traffic control services to all aircraft operating below 2,500 feet (758 meters) within a five-statute-mile radius of the station. Approach and departure control is also provided to aircraft operating within the airspace delegated to the station by the FAA. Under instrument conditions (i.e., poor visibility, weather), positive control, separation, and sequencing are provided to aircraft operating to and from other air facilities in the region, such as Hilton Head Airport, Beaufort County Airport, Ridgeland Airport, and Laurel Hill Airport (SOUTHDIV 1994).

Typical approach, departure, GCA Box, and FCLP flight tracks associated with Runway 5 are shown on Figure 3.2-2. Table 3.2-1 presents 1997 F/A-18 operations (i.e., landings, takeoffs, FCLP operations, etc.) at MCAS Beaufort. The 1997 operations data were

Table 3.2-1

1997 EXISTING F/A-18 OPERATIONS
MCAS BEAUFORT

Activity Description	Day Operations	Night Operations	Total Operations
Full Stop Arrivals	5,541	227	5,768
Overhead and Carrier Break Arrivals	4,871	41	4,912
Departures	10,587	93	10,680
Touch-and-Go Operations/Low Approaches	4,546	160	4,706
Field Carrier Landing Practice	9,805	2,088	11,893
GCA Box	28	0	28
Total	35,378	2,609	37,987

Source: Wyle Labs 1997.

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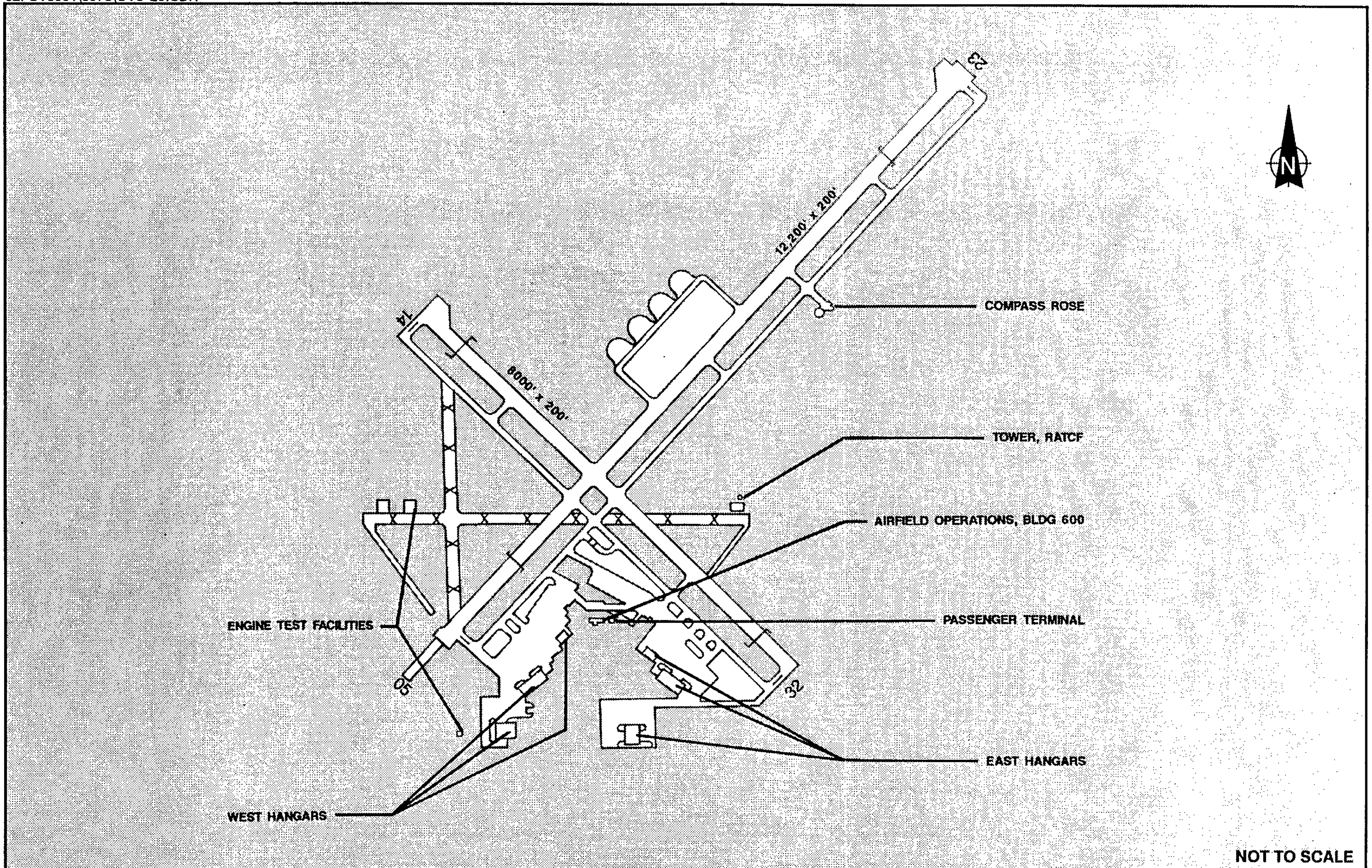

SOURCE: SOUTHDIV 1994

Figure 3.2-1 AIRFIELD LAYOUT - MCAS BEAUFORT

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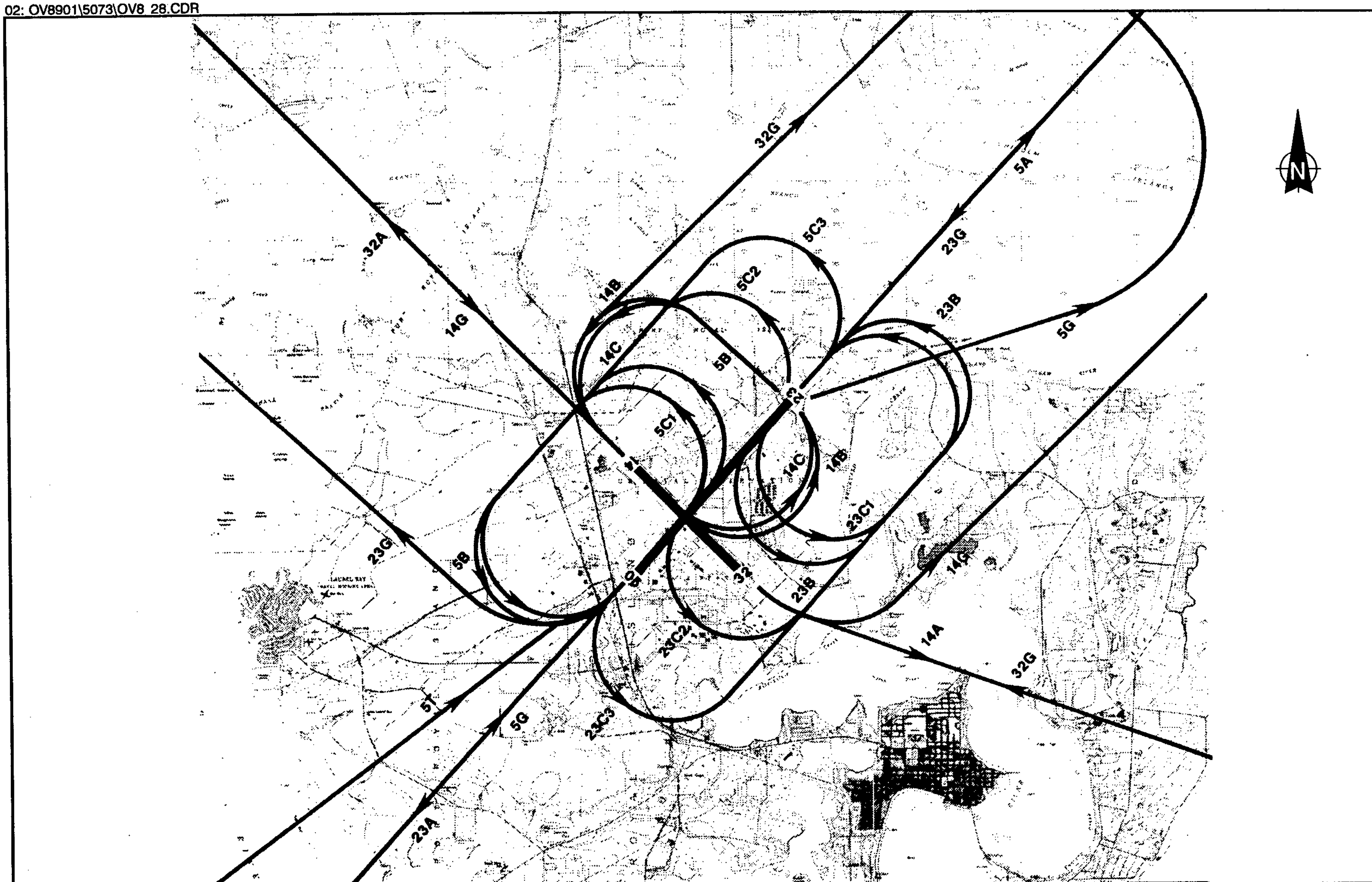

SOURCE: SOUTHDIV 1994

SCALE
0 5,000 10,000 Feet

Figure 3.2-2 TYPICAL FLIGHT TRACKS - MCAS BEAUFORT

based on 1995 air traffic counts and reflect squadron decommissioning occurring between 1995 and 1997 (Wyle Labs 1997).

3.2.2 Military Training Areas

Airspace typically used by aircraft stationed at MCAS Beaufort extends from South Carolina south along the Atlantic coast to Georgia. The airspace extends over both land and water areas and includes defense-related MTRs and special use airspace such as warning areas, restricted areas, and MOAs, which are all designed to support the various training missions at the station. Special use airspace in the vicinity of MCAS Beaufort is shown on Figure 3.2-3. Definitions of various categories of special use airspace are provided in Section 3.1.2.

3.2.2.1 Military Training Routes

Aircraft stationed at MCAS Beaufort use a variety of MTRs for low-level flight training. A limited number of these routes would be affected by F/A-18 aircraft transferred from NAS Cecil Field. These include VR-1004 (for flights to the Townsend Bombing Range), VR-97, VR-1040, and IR-18 (Riegel 1997).

3.2.2.2 Warning Areas

A number of off-shore warning areas are used by the aircraft at the station (see Figure 3.2-3). Descriptions of these areas are provided below.

W-74

W-74 is located southeast of the Beaufort 1 MOA over the Atlantic Ocean and St. Helena Sound. Use of W-74 is limited to four daylight hours per day, two days per month, by Notice to Airmen (NOTAM). W-74 is only activated in conjunction with the Beaufort 1, 2, and 3 MOAs.

TACTS Range

As at NAS Oceana, MCAS Beaufort operates its own TACTS range, located in the western portion of W-157A/W158C. It has functions and capabilities similar to those at the TACTS range near NAS Oceana except that the range is much larger (3,200 square miles [8,288 square kilometers]) and is divided into two parts. Typically, it is operated as two separate but adjacent ranges identified as the north and south ranges. It may also be

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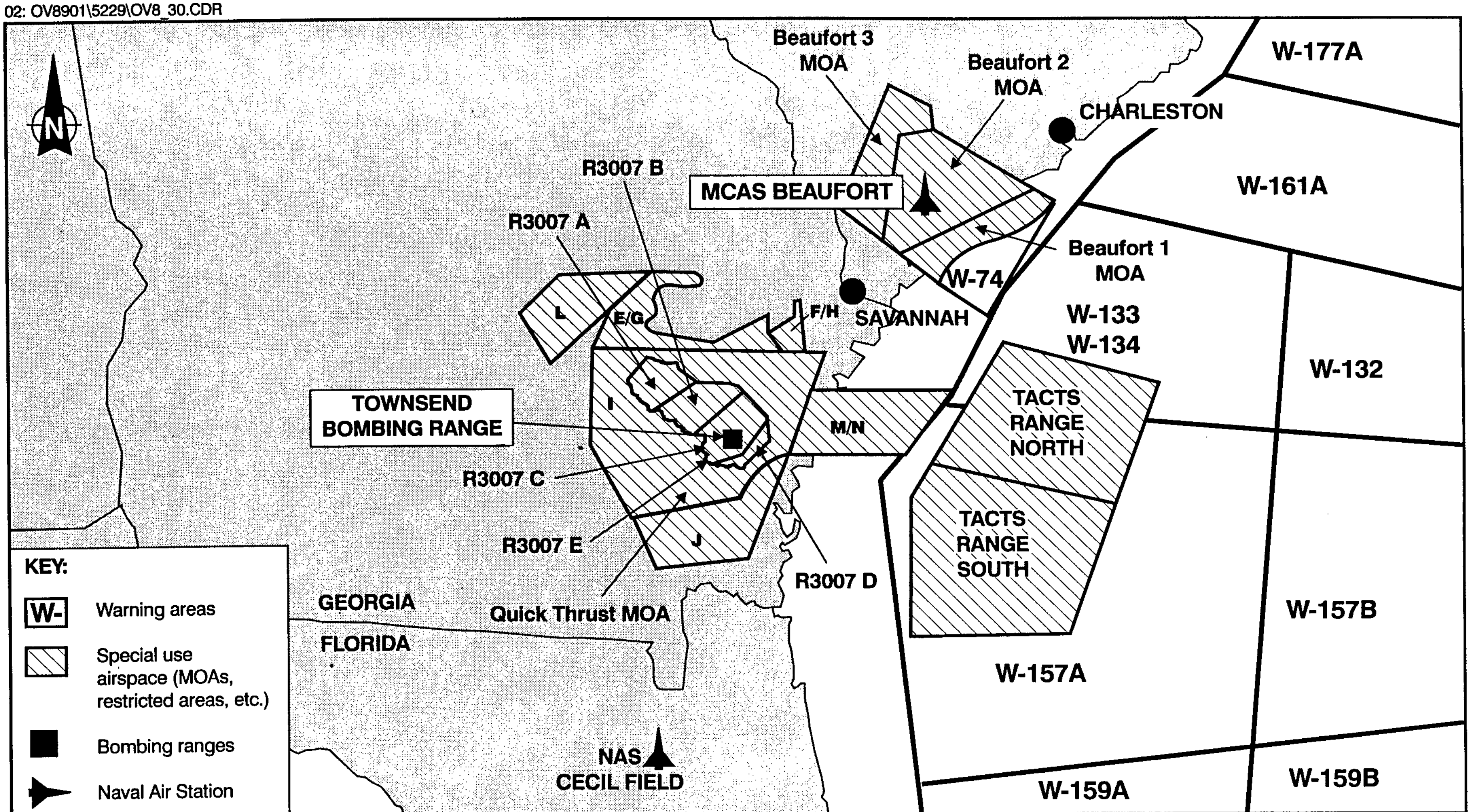

SOURCE: Georgia Air National Guard 1996

NOT TO SCALE

Figure 3.2-3 SPECIAL USE AIRSPACE - MCAS BEAUFORT

scheduled as one large range, if necessary. Airspace is not a limiting factor at the Beaufort TACTS range.

3.2.2.3 Military Operating Areas

A series of MOAs are regularly used by MCAS Beaufort aircraft (see Figure 3.2-3). Descriptions of these MOAs are provided below.

Beaufort 1, 2, and 3 MOAs

MCAS Beaufort lies in the center of a series of three adjoining MOAs, which have strict operating requirements. The Beaufort 2 MOA overlays the station, and extends northeast to the Town of Jacksonboro and southwest to southern Beaufort County. This MOA is bordered on the southeast by the Beaufort 1 MOA and on the northwest by the Beaufort 3 MOA. All of the MOAs include airspace beginning at 100 feet (30.5 meters) above ground level, up to and including 10,000 feet (3,049 meters) for the Beaufort 1 MOA, 7,000 feet (2,134 meters) for the Beaufort 2 MOA, and 2,000 feet (606 meters) for the Beaufort 3 MOA (SOUTHDIV 1994). Time of use of these MOAs is intermittent: four daylight hours per day and two days per month, by NOTAM. The controlling agency is the Jacksonville Air Route Traffic Control Center (SOUTHDIV 1994). Special procedures are in place to ensure that aircraft avoid operations near other air facilities and populated areas that lie under these MOAs.

Quick Thrust M and N MOA

The temporary Quick Thrust MOAs, which consist of nine subdivisions, are managed and scheduled by the Georgia Air National Guard through the Savannah Combat Readiness Training Center (Georgia Air National Guard 1996). These MOAs provide the greatest horizontal and vertical extent for training activities in this area. Individual MOAs provide training airspace within various altitude blocks, with Quick Thrust MOAs G, H, J, L, and M consisting of relatively narrow altitude blocks at medium altitudes and MOAs E, F, and N offering low altitude blocks. Only MOA I, which covers approximately half of the total airspace, extends from low altitude (100 feet [30.3 meters] above ground level [AGL]) to medium altitude (14,000 feet [4,242 meters]) in a contiguous block. Quick Thrust MOAs M and N provide two narrow altitude blocks separated by 8,000 vertical feet (2,424 meters). This separation leaves enough airspace to permit general aviation air traffic access along coastal routes (Georgia Air National Guard 1996).

Under the current structure, each of these temporary MOAs can be activated for use only twice per year for periods up to 14 days. Additionally, these MOAs do not provide contiguous airspace over the entire area; other airspace units, including those scheduled by the U.S. Army and U.S. Navy, are interspersed among the Quick Thrust MOAs (Georgia Air National Guard 1996).

3.2.2.4 Restricted Areas

Three adjoining restricted areas would potentially be affected by implementation of the proposed action: R-3007A, B, and C, located in eastern Georgia, north of the city of Brunswick. These areas support various high- and low-altitude training operations and contain one target range (see Section 3.2.3).

3.2.3 Target Ranges

In the vicinity of the station, MCAS Beaufort operates the Townsend Bombing Range (TBR), which is a 5,200-acre (2,104 hectares) range located in the western portion of McIntosh County, Georgia (see Figure 3.2-4), roughly 75 miles (121 km) south of the station. The TBR is owned by MCAS Beaufort and operated by the Georgia Air National Guard. The range is authorized for inert weapons delivery only and is regularly used by Navy, Marine Corps, Air Force, and Air National Guard fighter and attack units. The range is primarily used for mission training for F/A-18, F-16, A-10, and A-6 aircraft. Typical inert ordnance delivered at the site would include similar types of weapons used at BT-9, BT-11, and the Dare County Range in North Carolina (see Section 3.1.3).

Land Use

Existing land use at the TBR is shown on Figure 3.2-5. The TBR contains two administrative buildings, a target area, a manned control tower, an unmanned control tower, and various outdoor staging areas (Georgia Air National Guard 1996). Several dirt roads (allowing motorized access to most of the range area) and two drainage canals cross the range. The most prominent land use in the vicinity of the range is agriculture, consisting primarily of the harvesting of pine trees for the production of commercial pulpwood; in McIntosh County, more than 67,500 acres (27,000 hectares) are dedicated to timber

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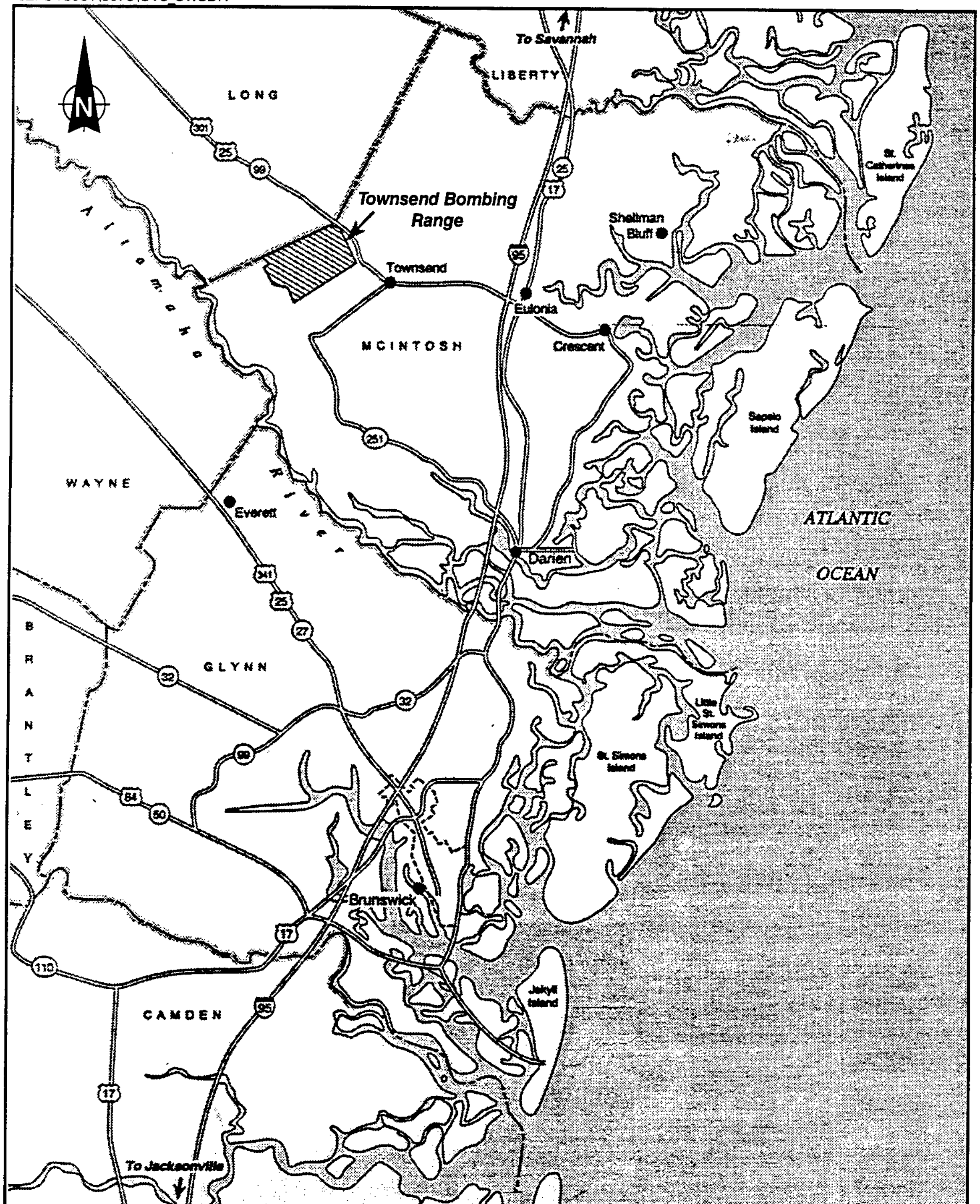

SOURCE: Georgia Air National Guard 1996

SCALE
0 6 12 Miles

Figure 3.2-4 REGIONAL LOCATION MAP - TOWNSEND BOMBING RANGE

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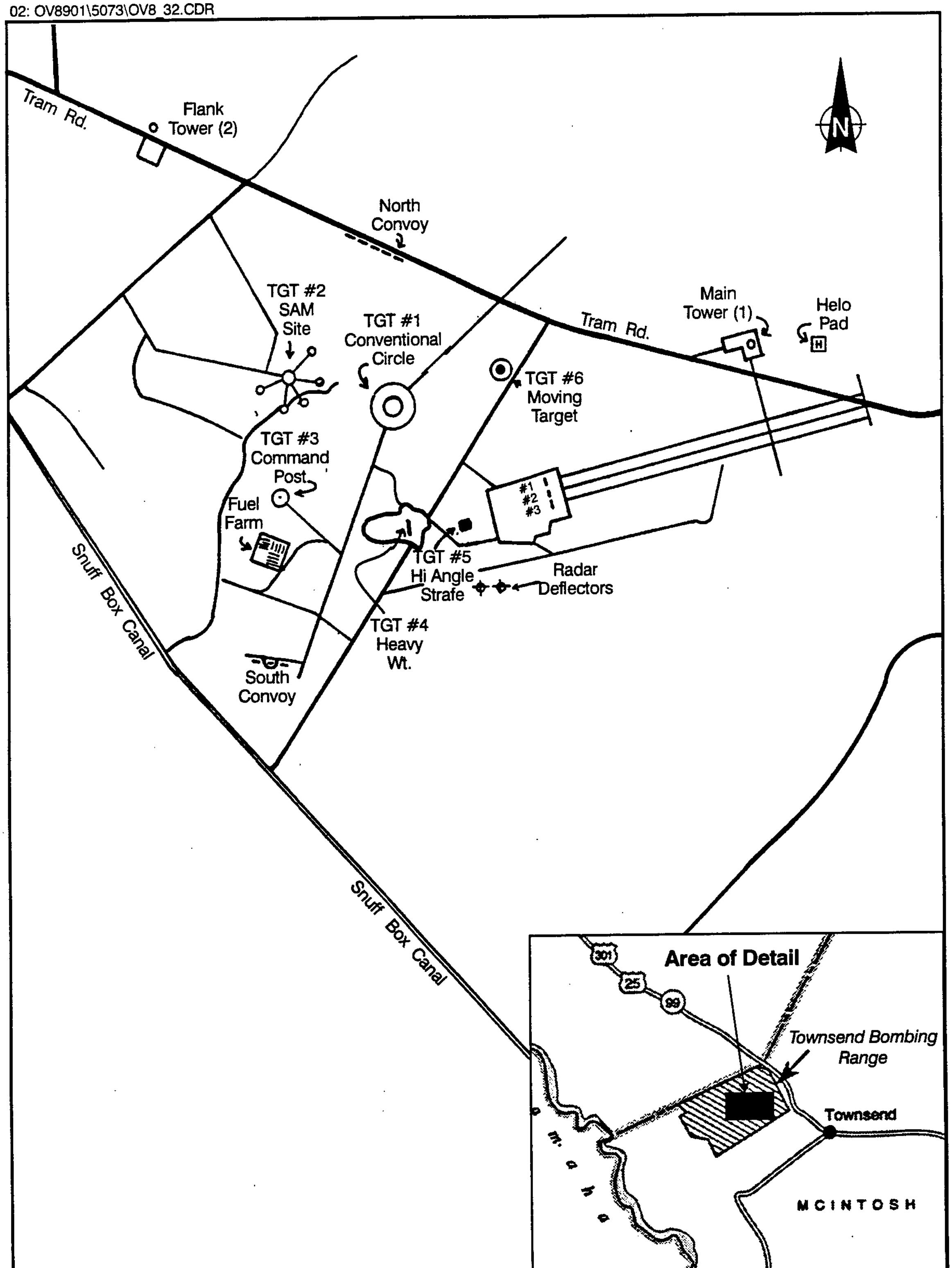

SOURCE: Georgia Air National Guard 1996

NOT TO SCALE

Figure 3.2-5 EXISTING LAND USE AT TOWNSEND BOMBING RANGE

production. In total, approximately 70% of the land in McIntosh County and 58.5% of neighboring Long County are forested (Georgia Air National Guard 1996).

The closest community to the range is Townsend, located about 3 miles (5 km) to the southeast at the intersection of State Route (SR) 57 and SR 251.

Aquatic Resources

McIntosh County contains a variety of surface water resources, including salt- and freshwater marshes, swamps, ponds, rivers, and streams. There are no large freshwater lakes in the county. The TBR is located in the Altamaha River Basin, which has a total drainage area of approximately 13,600 square miles (35,360 square kilometers). Rainfall in the area ranges from 40 to 60 inches (102 to 152 centimeters) per year, and drainage at the range is to the southeast. No surface water resources exist on range property (Georgia Air National Guard 1996).

Terrestrial Resources

The vegetation communities of TBR are primarily pine forests interspersed with wetlands and swamps. Most of the site has been severely altered by forestry management practices, and a portion of the site (approximately 200 acres [81 hectares]) is severely altered by inert bombing and other operational activities (Sabine and Waters, Inc. 1994). The TBR has been extensively ditched to reduce surface inundation.

The vegetation communities are representative of intensively managed pine forest woodlands throughout the area. Intensive forest management practices over the last 60 years have displaced many of the climax long-leaf pine (*Pinus palustris*) and pine-mixed hardwood communities that were originally endemic to the area (Sabine and Waters, Inc. 1994). The upland cover vegetation can be categorized into four cover types: pine forest, mixed-pine hardwood forest, mixed hardwood maintained, and disturbed/developed areas (see Figure 3.2-6).

Wetland areas on TBR were identified and delineated in 1994 by Sabine and Waters, Inc., according to the methodology developed by the 1987 *USACE Wetlands Delineation Manual* (Environmental Laboratory 1987). The wetland communities on TBR were characterized according to the National Wetland Inventory (NWI) classification system developed by the USFWS (Cowardin et al. 1979). Field investigations and high-altitude photographic interpretation have resulted in the identification of four wetland habitat types: palustrine

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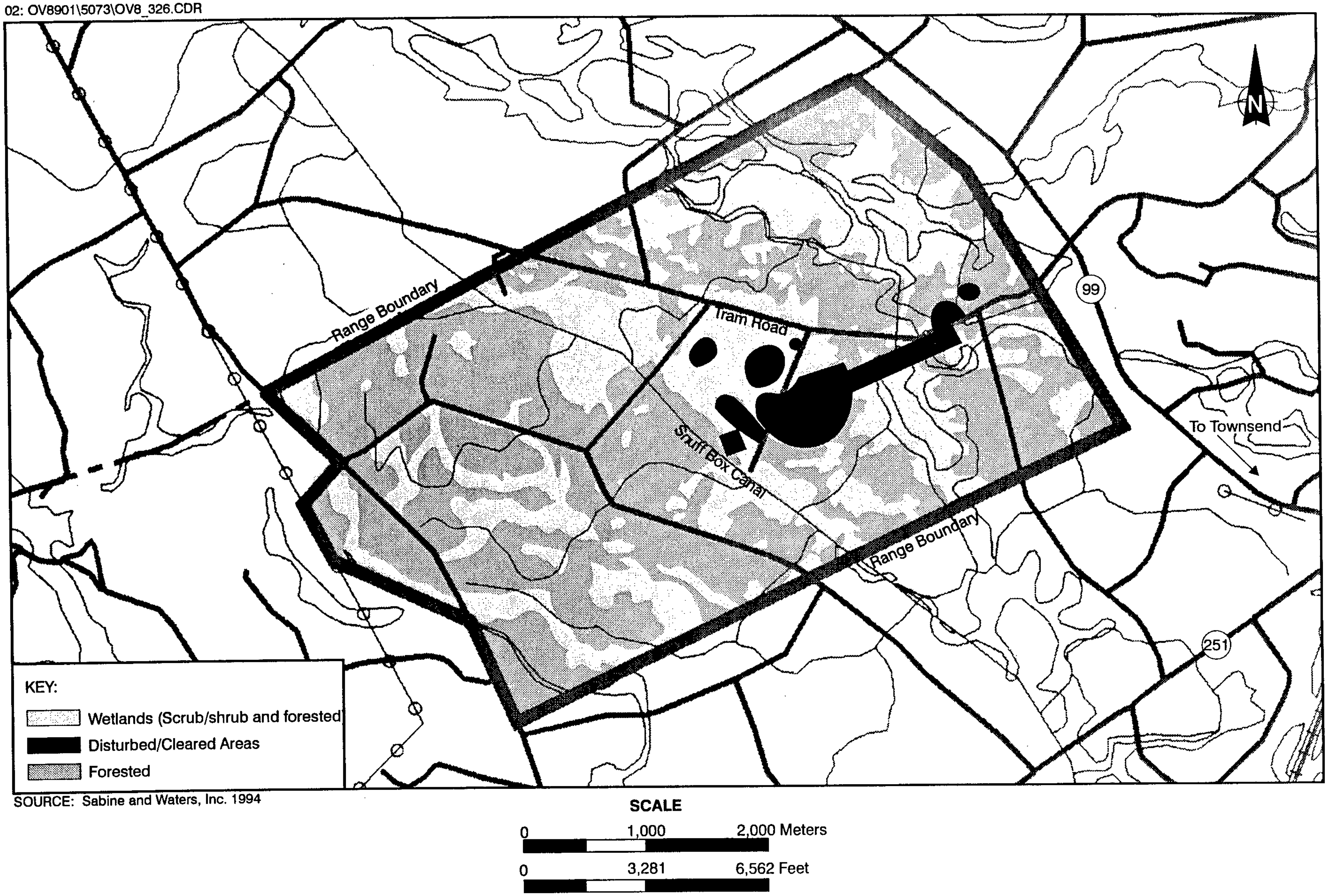

SOURCE: Sabine and Waters, Inc. 1994

Figure 3.2-6 VEGETATION/WETLAND COVER—TOWNSEND BOMBING RANGE

forested, palustrine scrub-shrub, palustrine emergent, and palustrine open water/canal (see Figure 3.2-6).

An inventory of rare, threatened and endangered plant and animal species was conducted at TBR in 1994 by Sabine and Waters, Inc. Four species were identified as possibly occurring on TBR during the inventory. Two of the identified species, the flatwoods salamander (*Ambystoma cingulatum*) and Bachman's sparrow (*Aimophila aestivalis*), are federally-listed as candidate species. The woodstork (*Mycteria americana*) and the loggerhead shrike (*Lanius ludovicianus*), were considered incidental and/or transient species (Sabine and Waters, Inc. 1994). Although the presence of suitable nesting habitat for woodstorks is unlikely to occur on TBR, suitable foraging habitat exists in the palustrine emergent wetlands. Furthermore, suitable nesting/foraging habitat for the loggerhead shrike was identified on TBR; however, attempts to locate a nest were unsuccessful.

3.2.4 MCAS Beaufort Land Use

3.2.4.1 Existing Land Use

Air operations constitute the largest land use activity at the station, consisting of two cross runways, parking aprons, taxiways, clear zones, and APZs. Air operations influence and define other land use activities at the station, which include administration, community and medical facilities, recreation, family and troop housing, supply/storage, training, ordnance storage, and maintenance/utilities.

The majority of development at the station occurs in the core area, south of the runway configuration (see Figure 3.2-7). The core area is a mixture of land uses which include air operations, training, and maintenance/utility uses adjacent to Runways 5 and 32. Much of the remaining core area is occupied by medical, supply/storage, administration, community troop housing, and recreational land uses.

The Laurel Bay Family Housing Area, used primarily for enlisted and officer family housing, is located 3 miles west of the base, along SC 116. Single-family residential use is the primary land use. This use is located in the central portion of the 1,062-acre property, which is surrounded by recreation, open space, and community facilities (see Figure 3.2-8). The northern section of the property is an undeveloped forested area; the proposed land use designations for this area are primarily family housing, open space, and recreation.

Land uses adjacent to MCAS Beaufort are depicted in Figure 3.2-9. Lands immediately east and south of the station are unimproved saltwater wetlands associated with Brickyard and Albergotti creeks, respectively. Land uses east of Brickyard Creek are single-

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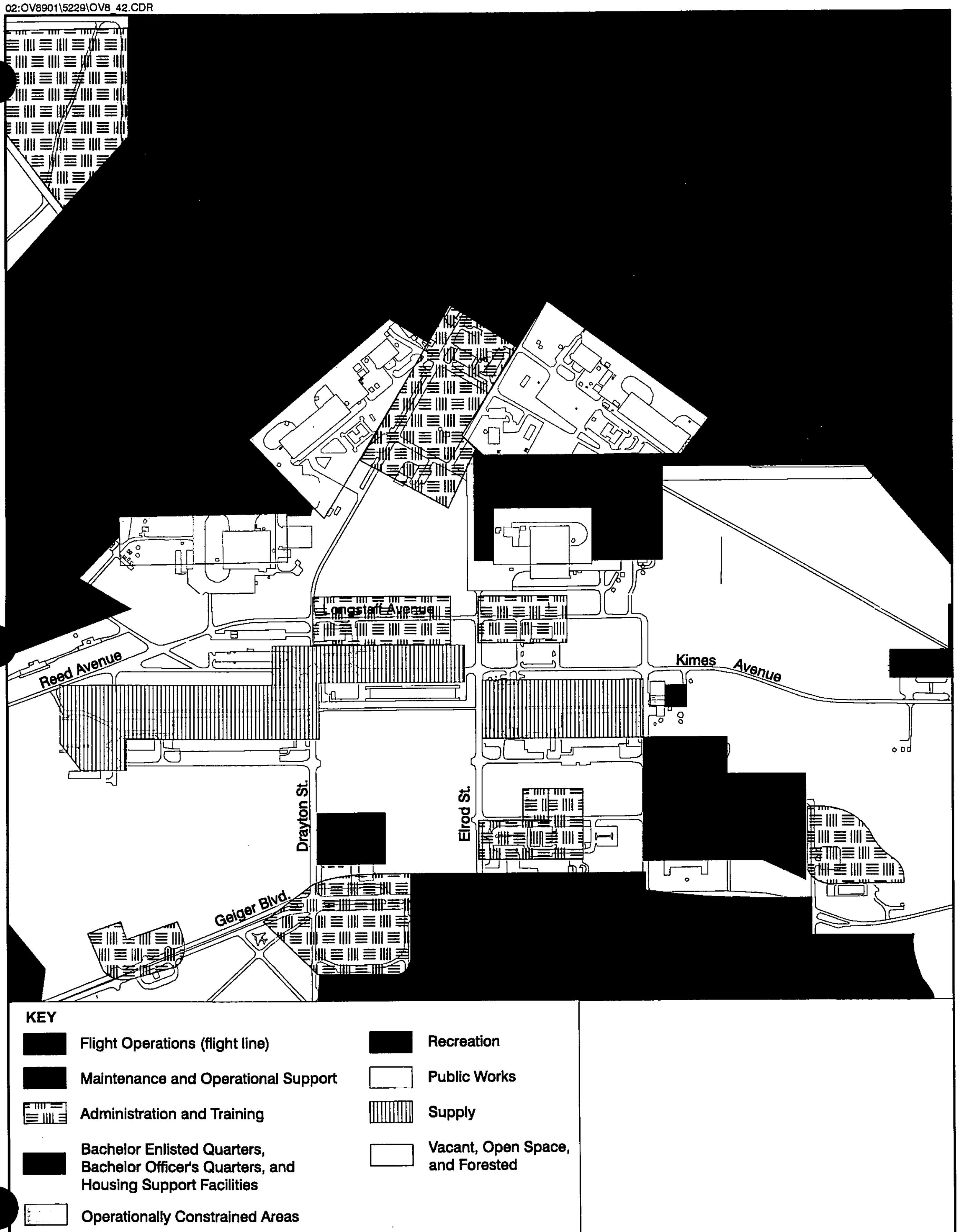
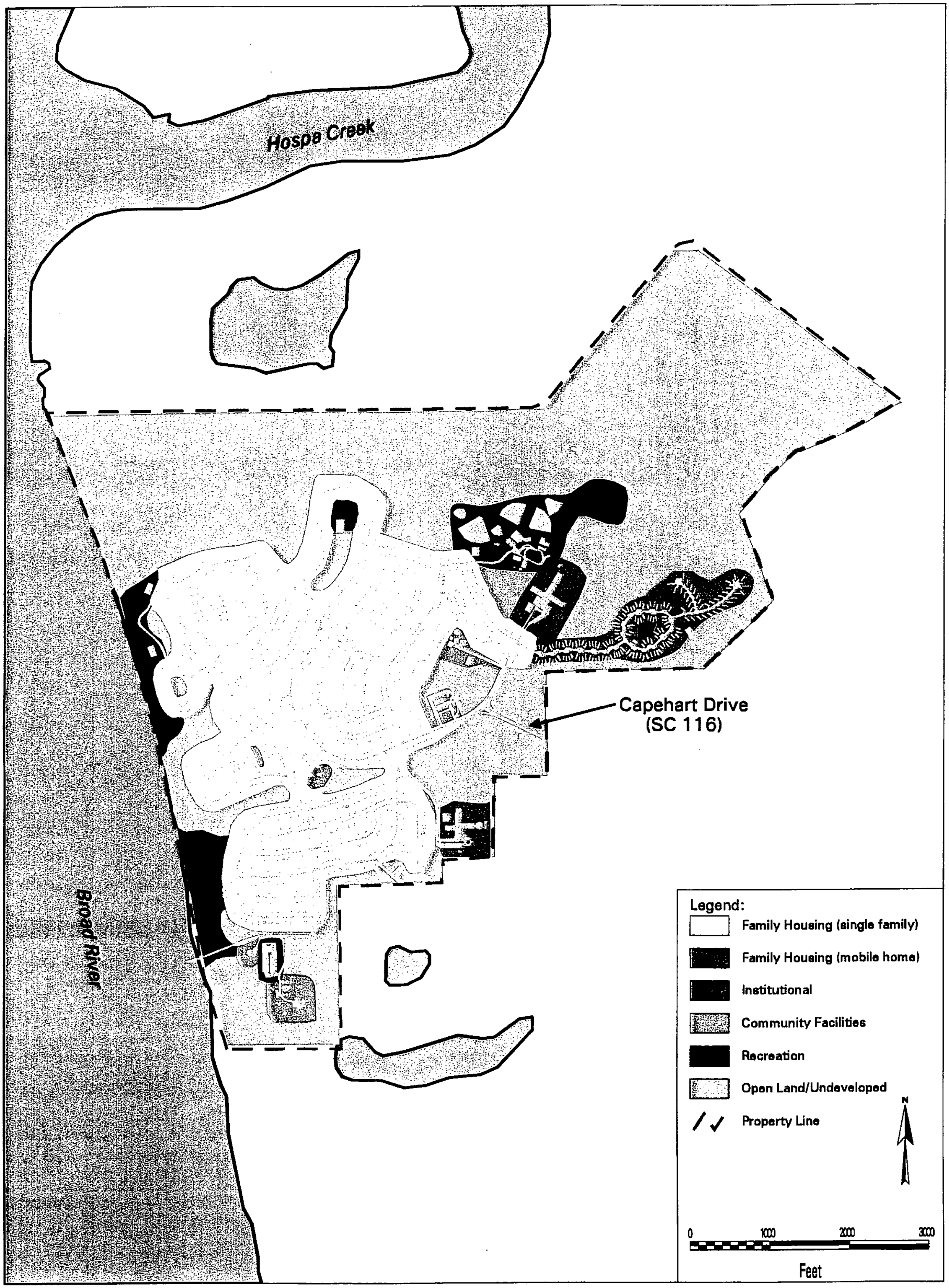


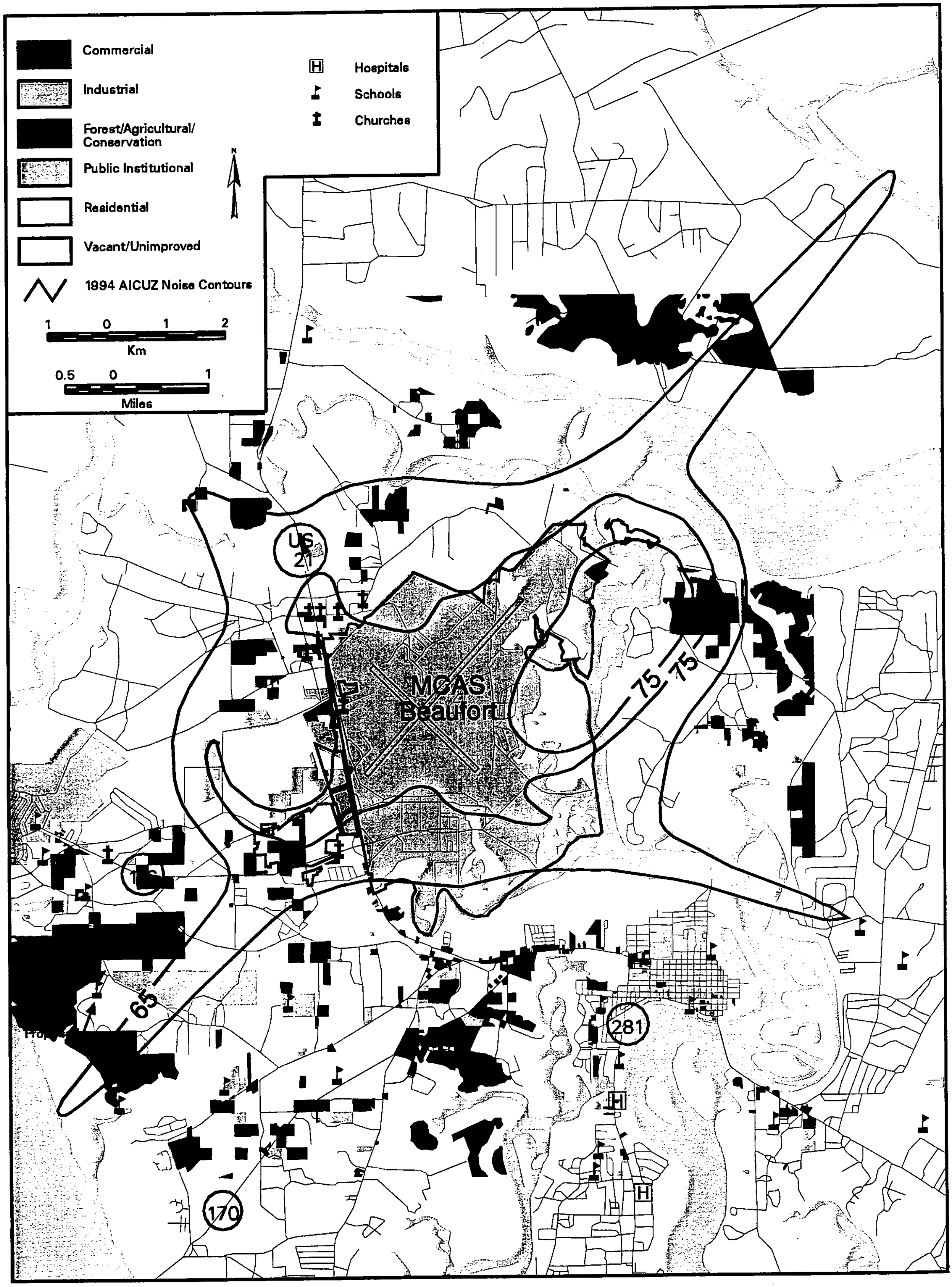
SOURCE: SOUTHDIV 1994

Figure 3.2-7 EXISTING LAND USE - MCAS BEAUFORT CORE AREA



Source: SOUTHDIV 1994

Figure 3.2-8
Existing Land Use at Laurel Bay Family Housing Area
MCAS Beaufort



Source: SOUTHDIV 1994

Figure 3.2-9
Regional Land Use and Existing AICUZ Noise Contours
MCAS Beaufort

family residential, forested/natural, and agriculture. Land use south of Albergotti Creek, along the major transportation corridors is primarily commercial. Off the main transportation corridors, the principal land uses are agriculture, forested/natural, and residential. The north and northeast areas of the station are bordered by low-density residential and agriculture land uses, with some commercial activities along U.S. 21. The land west of MCAS Beaufort, along and west of U.S. 21, is dominated by the county's principal industrial park. Other land uses west of the station are primarily forested/natural, public/institutional, and agriculture.

3.2.4.2 Plans and Policies

Development at MCAS Beaufort is guided or influenced by the following plans and policies:

- Master Plan, MCAS Beaufort;
- MCAS Beaufort AICUZ Program;
- Beaufort County Comprehensive Plan;
- City of Beaufort and Beaufort County zoning ordinances;
- South Carolina Coastal Zone Management Program; and
- Natural Resources Management Plan, MCAS Beaufort.

Master Plan, MCAS Beaufort

The master plan provides for the efficient and orderly development of real estate and facilities so the station can successfully complete its assigned mission. The plan serves as a tool for all forms of decision making relative to the station's physical development issues. The overall objective of the master plan is to provide a comprehensive plan that ensures logical and efficient use of real estate, facilities, and other assets; guides growth and change; provides the mechanism for ensuring that projects are designed to meet operational, safety, and environmental requirements; and ensures that road and utility infrastructure support and site improvements have been considered (SOUTHDIV 1994).

AICUZ Program

The goal and objective of the AICUZ program at the station is to encourage land use compatibility between the military air facility and local communities while maintaining the operational integrity of the station (see Section 3.1.4.2 for AICUZ definitions). The existing

AICUZ footprint at MCAS Beaufort is depicted on Figure 3.2-10 and includes APZs and noise exposure contours.

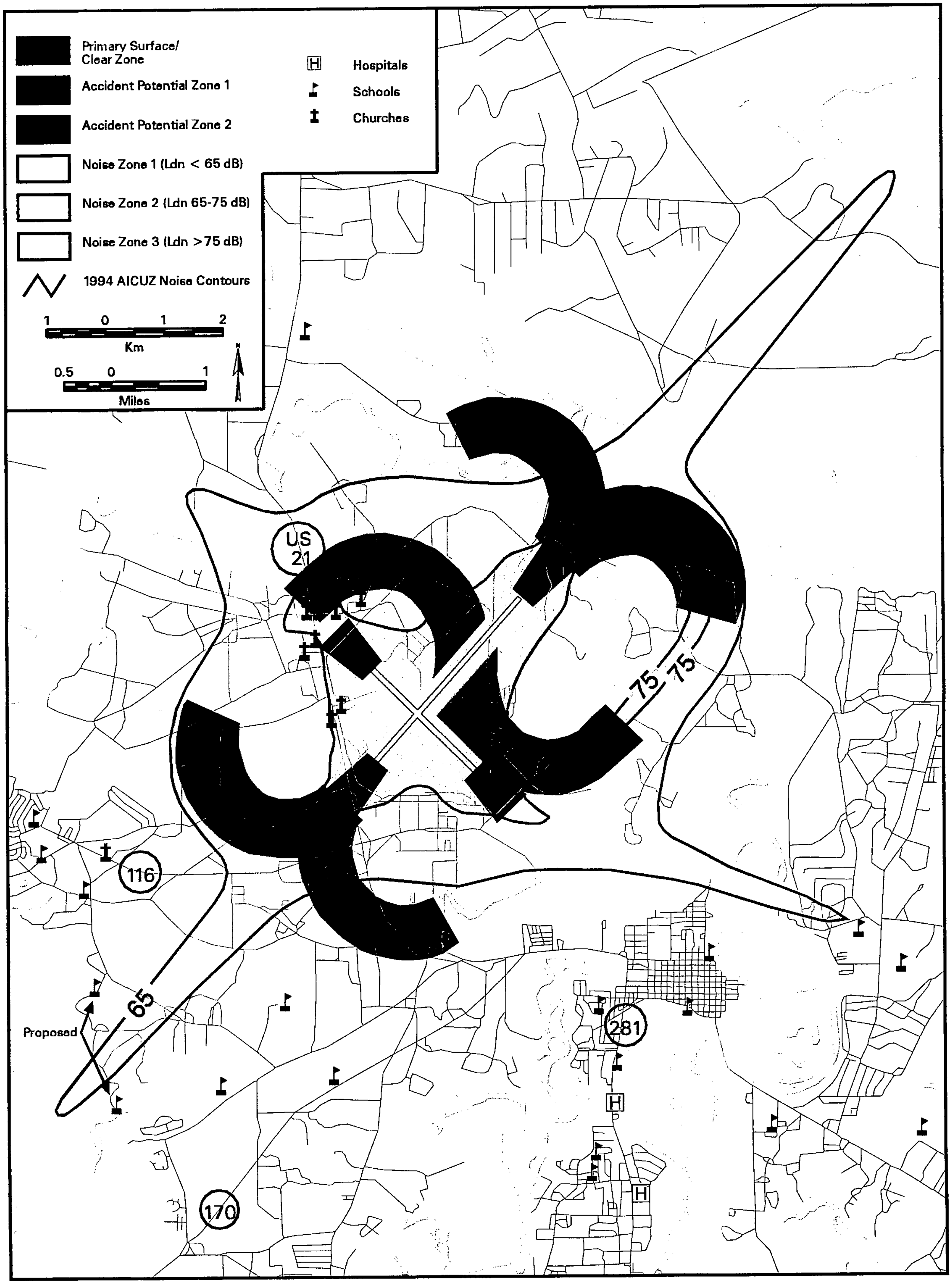
Figure 3.2-11 presents land use within the three levels of APZs defined for runways 5, 14, 23, and 32. The area devoted to each land use within the APZs is presented in Table 3.2-2. The clear zones for each runway are generally confined within the boundaries of MCAS Beaufort. Vacant/unimproved land use is the dominant land use cover underlying APZ 1 and APZ 2. Some scattered pockets of residential uses are located in APZ 1 and APZ 2, particularly to the west and southwest of the station.

To mitigate potential noise incompatibilities with surrounding land uses, MCAS Beaufort has acquired a number of parcels over the last 10 years as part of their AICUZ program. The most recent acquisition, completed in 1992, was the purchase by deed of 374 acres (151 hectares) of noncontiguous parcels in the station's APZs and high-noise zones. This acquisition completed the station's program of acquiring development rights to all unimproved parcels within the APZs and high-noise zones (Jackson 1996).

Beaufort County Comprehensive Plan

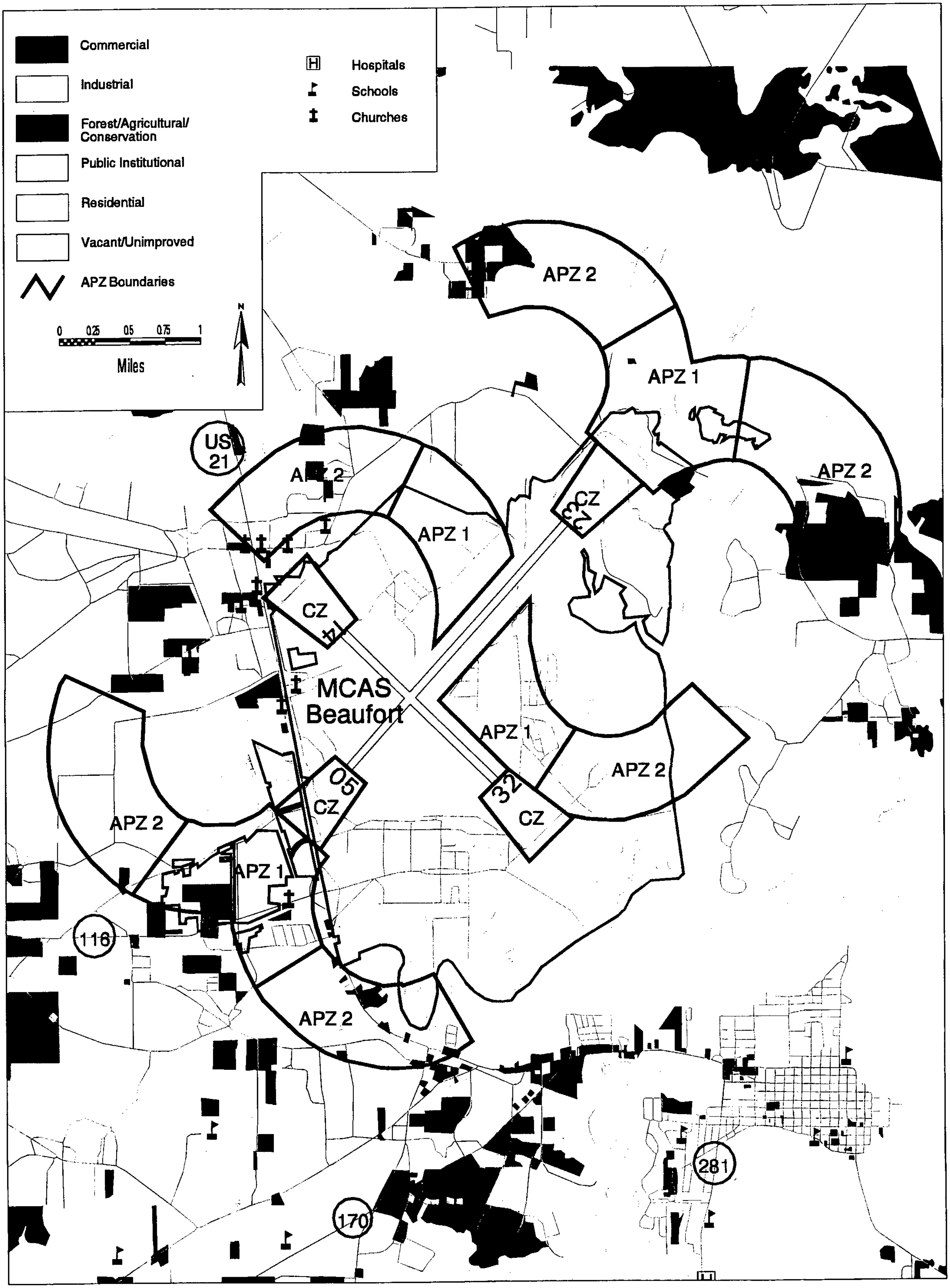
In 1994, the State of South Carolina mandated that each county develop and adopt a comprehensive plan by 1999. The preliminary draft of the Beaufort County Comprehensive Plan was made available for public review in October 1996. This is the first comprehensive plan for the county; when adopted, it will be the primary public policy document forming the legal basis for any future land use ordinances. The body of the plan discusses existing conditions, develops future goals/objectives, and recommends implementation strategies for such issues as future land use; natural resources and water quality; cultural resources; affordable housing; parks, recreation, and open space; community facilities; transportation; and the economy.

Two additional components of the plan include the CIP, which will provide estimates of the cost of implementing various components of the plan, and the revision to the Beaufort County Zoning and Development Standards Ordinance to implement the recommended goals and actions within the plan. For example, the plan recommends that the county's regulations regarding its airport overlay district (AOD) (see zoning ordinance section below for AOD explanation) be reviewed and modified to eliminate confusing language and ensure the inclusion of MCAS Beaufort AICUZ goals (Land Ethics, Inc. 1996).



Source: SOUTHDIV 1994

Figure 3.2-10
AICUZ Boundaries - MCAS Beaufort



Source: SOUTHDIV 1994

Figure 3.2-11
MCAS Beaufort Existing APZs and Land Use

Table 3.2-2

EXISTING LAND USE WITHIN APZs AT MCAS BEAUFORT

APZ	Land Use	Acres	Hectares
Clear Zone	Public Institutional	498	202
	Unimproved/Vacant	21	8
	Residential	1	<1
APZ 1	Unimproved/Vacant	812	329
	Public Institutional	782	298
	Residential	120	48
	Forested/Agricultural/Conservation	54	22
	Industrial	8	3
	Commercial	3	<1
	Water	155	62
APZ 2	Unimproved/Vacant	2,049	979
	Residential	319	130
	Forested/Agricultural/Conservation	248	100
	Public Institutional	169	68
	Industrial	59	24
	Commercial	26	10
	Water	371	150
TOTAL AREA		5,695	2,283

Zoning Ordinances

The Beaufort County and the City of Beaufort Zoning and Development Standards ordinances set forth specific regulations regarding the development of lands within their jurisdictions. As a federal facility, MCAS Beaufort is exempt from jurisdictional zoning regulations.

In 1990, Beaufort County adopted its first comprehensive zoning regulation: Zoning and Development Standards, Ordinance 90/3. These standards establish controls for land uses in unincorporated areas of the county. The ordinance established 17 zoning districts and 8 overlay districts. Areas north and northeast of the station are zoned for low-density residential, agriculture, and conservation/preservation uses. Lands west of the station along U.S. 21 are zoned for a mixture of industrial, commercial, residential, and airport activities. The lands south of the station, along U.S. 21 leading to the City of Beaufort, are also zoned for commercial, industrial, and residential activities. In general, areas outside the transportation corridors surrounding MCAS Beaufort are zoned for planned districts and residential, low-density residential/agriculture, and conservation/preservation uses.

As part of the zoning ordinance, the county has established eight overlay districts for areas of special concern. The AOD created under Ordinance 90/3 was established to protect future development from the effects of aircraft noise and accident potential and to prevent obstruction to air navigation. The overlay district defines various airport noise zones and APZs on the county's official zoning map.

Allowable land uses within the AOD are those uses established by the county zoning ordinance for the applicable zoning district. However, certain uses are subject to the following conditions:

- Commercial development in accordance with the ordinance is permitted, but it is advised that reception, lounge, and office areas be designed with a 30-dBA noise level reduction (NLR).
- Medical and other health services such as hospitals, nursing homes, clinics and similar uses must be designed with a 60-dBA NLR.
- Industrial uses such as warehousing, wholesale, and assembly plants are permitted, but it is advised that reception, lounge, and office areas be designed with a 25-dBA NLR.
- Public and quasi-public service structures such as churches, government offices, postal services, schools, libraries, museums, art galleries, and similar uses cannot be erected in areas where noise levels exceed 65 dBA.

At present, there are no restrictions or special requirements for residential structures, including mobile homes, within the AOD (Tank 1996). Therefore, special development requirements established by the zoning ordinances are applicable only to future commercial, industrial, medical and health, and public and quasi-public services.

In general, APZ 1 for Runway 23 is confined to the station or to the preservation/conservation land use category. APZ 2 for Runway 23 overlaps the planned district and residential zoning classifications. The clear zone for Runway 5, which crosses U.S. 21, is zoned airport. For Runway 5, APZs 1 and 2 are primarily zoned industrial with scattered areas zoned airport, residential, and commercial. Clear zones for Runways 14 and 32 are confined to the station and, at present, do not have identified APZs.

The City of Beaufort zoning ordinance was adopted in May 1972 and did not include an AICUZ or special airport overlay element. In May 1997, the city adopted an AICUZ overlay. There are parcels of land within the city limits in the AICUZ.

Coastal Zone Management Program

The Office of Ocean and Coastal Resource Management (OCRM), a division of the South Carolina Department of Health and Environmental Control (SCDHEC), implemented the state's Coastal Zone Management Act (Act 123) of 1977, which was approved by the Federal government in 1979. The purpose of the act is to "protect the quality of the coastal environment and to promote the economic and social improvement of the coastal zone and all the people of the state through the implementation of a coastal zone management program."

OCRM developed the South Carolina Coastal Zone Management Program (SCCZMP) which establishes the goals and policies used to guide the OCRM. OCRM implements the program and has direct permitting authority over "critical areas" of the coast, which are defined as coastal waters, tidelands, and beach/dune systems. OCRM has indirect management authority of coastal resources throughout the coastal zone, which encompasses the eight coastal counties (including Beaufort County). SCDHEC is required to determine whether a federal-level action is in compliance with the policies of the SCCZMP (i.e., consistent to the maximum extent practicable).

Natural Resources Management Plan

Department of Defense Instruction Manual (DODINST) 4700.4 requires the Department of the Navy to implement and maintain a balanced and integrated program for the management of natural resources. Secretary of the Navy Instructional Manual (SECNAVINST) 62.40.6E assigns responsibility for development and implementation of a

natural resources program to the Chief of Naval Operation and the Commandant of the Marine Corps. Marine Corps Order (MCO) P5090.2 requires that each Marine Corps installation having land or water areas suitable for the conservation and management of natural resources, or with natural resource problems, prepare a multiple-use natural resources management plan. The plan is to include all phases of natural resources management applicable to the installation, future requirements, and projects to be accomplished. The MCAS Beaufort Natural Resources Management Plan includes sections on the management of lands; fish, wildlife, and endangered species; outdoor recreation; wetlands and floodplains; off-road vehicles; and natural areas.

3.2.5 Socioeconomics and Community Services

3.2.5.1 Population, Employment, Housing, and Taxes/Revenues

Approximately 4,030 military and civilian personnel are currently assigned to MCAS Beaufort, including 370 officers, 3,040 enlisted personnel, and 620 civilian employees. Personnel loading information by major activity/tenant is provided in Table 3.2-3. As presented, aircraft squadrons were the largest activities on station, accounting for approximately 190 officers and 1,320 enlisted personnel.

Total personnel loadings are expected to remain relatively constant for the next five years. The on-base population at MCAS Beaufort is expected to remain at approximately 4,030 military and civilian personnel over the next five years.

MCAS Beaufort is located in Beaufort County, South Carolina. Almost all military and civilian personnel assigned to MCAS Beaufort reside in Beaufort County. Table 3.2-4 provides a geographical distribution of all military and civilian personnel employed at MCAS Beaufort by place of residence. As shown on the table, 98% of these personnel live in Beaufort County, with the remaining 2% residing in various nearby counties.

According to the U.S. Bureau of the Census, the total population in Beaufort County was 86,425 persons in 1990. This figure represents an increase of approximately 32% over the 1980 figure of 65,364 persons. Population statistics in Beaufort County have been calculated by region. Northern Beaufort County, the area in which MCAS Beaufort is located contains approximately 47% of the county's total population. The remaining 53% of the population is located in the area south of the Broad River including Hilton Head Island.

The total population of Beaufort County has continued to grow since 1990. Population estimates show that Beaufort County's total 1995 population reached approximately 103,600 residents. Total population in the county is expected to continue to expand through-

Table 3.2-3

PERSONNEL LOADINGS AT MCAS BEAUFORT BY MAJOR ACTIVITY

Activity	Officers	Enlisted	Civilians	Total
H&HS Beaufort	50	330	350	730
MACS-28	10	50	0	60
TAOC Detachment	20	110	0	130
ATC Detachment	0	60	0	60
MWSS-273, MWCS-27	30	620	0	650
MAG-31	20	80	0	100
MALS-31	20	300	0	320
Squadrons	190	1,320	0	1,510
CSSD-23	10	80	0	90
Other Activities	20	90	270	380
Total	370	3,040	620	4,030

Key:

ATC = Air Traffic Control.
CSSD = Combat Service Support Detachment.
H&HS = Headquarters and Headquarters Squadron.
MACS = Marine Air Control Squadron.
MAG = Marine Air Group.
MALS = Marine Air Logistics Group.
MWCS = Marine Wing Construction Squadron.
MWSS = Marine Wing Support Squadron.
TAOC = Tactical Air Operations Crew.

Source: Angell 1996.

out the next few decades. By the year 2000, Beaufort County is projected to have a total population of 123,500 residents. By 2005, total population in the county is expected to grow to 146,600 residents, and by 2010, the county's population is expected to reach 168,000 residents (U.S. Bureau of the Census 1993).

Economy, Employment, and Income

Beaufort County's economy has evolved from rural agricultural to one that revolves around military and tourism, residential development, and other service industries. Three major military installations are located in Beaufort County: MCRD Parris Island; MCAS Beaufort; and the Naval Hospital Beaufort.

Table 3.2-4 **GEOGRAPHICAL DISTRIBUTION OF MILITARY AND CIVILIAN PERSONNEL BY PLACE OF RESIDENCE**			
County	**% of Military Personnel**	**% of Civilians**	**% of Total Employees**
Beaufort	99	89	98
Charleston	0	2	1
Colleton	0	3	0
Hampton	0	3	0
Others	1	3	1
Total	100	100	100

Source: Snead 1996.

Approximately 23% of the total employment base in Beaufort County is directly related to the military. The resulting military payroll accounts for 37% of the total annual payroll in the county and approximately 55% of the total annual payroll in northern Beaufort County (Bessent, Hammack & Ruckman, Inc. 1995).

MCAS Beaufort alone provides a significant portion of this impact. Currently the station injects $125 million in the local economy each year through military and civilian payrolls. In addition, MCAS Beaufort spends approximately $4.3 million on utility purchases and $14.8 million on service contracts and material purchases each year. Finally, the annual construction budget for the station is approximately $23 million, with a significant portion of this budget being spent in the local economy (MCAS Beaufort 1995).

Tourism is also a very significant industry in the region. In 1991, the tourism industry generated approximately 12,270 jobs and had a corresponding annual payroll of $110 million. Additionally, $4.8 million in state taxes and $4.8 million in local taxes are generated by tourism each year in the county (Bessent, Hammack & Ruckman, Inc. 1995).

Based on the most recent data available, service industries are the largest employment sector in Beaufort County. Approximately 31.2% of the employed labor force in Beaufort County works in this industry. Wholesale/retail trade establishments and federal, state, and government jobs are the next largest employment sectors in the county and supply 30.0% and 18.2% of the total employed labor force with work, respectively. The financial, insurance,

and real estate establishments (7.4%), construction firms (7.0%), the transportation and utilities sector (3.2%), and manufacturing industries (3.0%) accounted for the remaining employed labor force (South Carolina Department of Commerce 1995).

Beaufort County is currently experiencing an extremely low unemployment rate of 2.8%. This figure is less than the 4.1% unemployment rate the county experienced in the previous year. These unemployment rates compare favorably to the statewide levels of 5.2% and 6.0%, respectively, for the same time period (South Carolina Department of Commerce 1995).

Beaufort County, when taken as a whole, is a very affluent county. According to the 1990 Census, Beaufort County ranks second among South Carolina counties in terms of per capita personal income. The total per capita income in the county is $16,115 compared to the statewide average of $11,897. However, this affluence is not evenly distributed throughout Beaufort County. Hilton Head Island has a major impact on the county's average; its high per capita income increases the average for the entire county and thereby overstates the affluence of other residents in Beaufort County. The total per capita income on Hilton Head Island is $25,171, compared to $12,801 in the City of Beaufort and $11,402 in the Town of Port Royal. Total income in these last two communities are much more in line with state and national income statistics (U.S. Bureau of the Census 1992).

Housing

The U.S. Marine Corps provides both bachelor and family housing to eligible military (officers and enlisted) personnel stationed at MCAS Beaufort. Currently there are 120 spaces in Bachelor Officer Quarters (BOQ) and 1,608 spaces in Bachelor Enlisted Quarters (BEQ) located on-station. These figures include both transient and permanent party quarters as well as quarters identified both as adequate and inadequate (Snead 1996). Most officers assigned to MCAS Beaufort prefer to live in the local community. As a result, the BOQs are operating with only a 45% occupancy rate (Snead 1996).

Typically, personnel in lower pay grades (E1 to E4) choose to live in the BEQs while more senior enlisted personnel usually choose to live off-station. Approximately 79.7% of all enlisted personnel residing in MCAS Beaufort's adequate BEQs are E1 to E4 personnel while the remaining 20.3% of the enlisted personnel are E5 (17.8%) and E6 to E9 personnel (2.5%) (Snead 1996).

The total number of personnel that can be housed in a BEQ varies with the rank and sex of the personnel assigned. The room configurations and the number of personnel that can be placed in a BEQ room varies by the rank of the individual. E1 to E4 personnel are

required to share a room, while more senior enlisted staff are given their own room or in some cases two rooms. Based on existing room configuration, the BEQs at MCAS Beaufort can house 1,608 enlisted personnel.

Adequate BEQ facilities have occupancy rates between 98% and 115% depending on the rank of the personnel, while inadequate BEQ facilities have occupancy rates of only 66%. Occupancy rates greater than 100% imply that enlisted personnel voluntarily live in "over-crowded" rooms, as defined by U.S. Marine Corps guidance, rather than live in the inadequate units (Snead 1996).

A major construction program is currently underway at MCAS Beaufort to improve the existing BEQs on-station. This program, which is scheduled to be completed in the spring of 1999, will result in the construction of six new BEQ buildings and demolition of the existing BEQs. Once completed, this program will provide 850 rooms/1,550 spaces. When the new BEQs were designed, it was anticipated that total occupancy would be approximately 88% to 89%. However, in July 1996 the U.S. Marine Corps revised criteria used to allocate space to military personnel residing in the BEQs. This change in criteria has led to a decrease in the number of personnel that can be billeted in the BEQs. As a result, once construction is completed, the BEQs are expected to have almost a 100% occupancy rate (Snead 1996).

In addition to these BOQs and BEQs, eligible military personnel assigned to MCAS Beaufort may also be supplied with family housing. Presently, there are approximately 1,560 suitable military-controlled units available in Beaufort County. MCAS Beaufort controls 1,276 housing units including those in the Laurel Bay Family Housing Area and those built on MCAS Beaufort. In addition, the family housing office at MCAS Beaufort owns and operates 157 mobile home spaces at the Laurel Bay Family Housing Area that can be rented by any military personnel. Depending on rank, personnel assigned to either MCAS Beaufort or MCRD Parris Island are eligible to receive family housing from these facilities. The Naval Hospital Beaufort has an additional 50 military-controlled units that are dedicated for use by personnel assigned to the hospital and MCRD Parris Island has 231 family housing units and 154 mobile home spaces available only to MCRD Parris Island personnel (Smith, M. 1996; Bessent, Hammack, and Ruckman, Inc. 1995).

Currently, family housing units at MCAS Beaufort are utilized to the fullest extent practicable; total occupancy of these units is nearly 100%. At this time there are approximately 400 families on the waiting list for MCAS Beaufort family housing units with the largest deficit in 2-bedroom, enlisted units (Smith, M. 1996).

There is an approved MILCON program that would, when completed, provide $14 million for new housing at MCAS Beaufort to meet existing demand. The funding could be used to construct either 140 permanent units or 280 or more public/private venture (PPV) units. A 121-acre section in the northern portion of the Laurel Bay Family Housing Area has been identified for the 280 or more PPV units. This program is expected to be approved, and new units constructed, regardless of the outcome of the proposed realignment of F/A-18 aircraft to MCAS Beaufort (Smith, M. 1996).

Based on data from the *1990 Census of Population and Housing*, a total of 45,980 housing units are located in Beaufort County. Single-family detached housing units account for the largest portion (49.9%) of the total housing stock in Beaufort County. The remaining 50.1% is made up of townhouses (7.2%), duplexes (1.9%), multi-family units (25.5%), mobile homes (14.5%), and other housing units (1.0%) (see Table 3.2-5).

Table 3.2-5

SELECTED HOUSING CHARACTERISTICS FOR BEAUFORT COUNTY

	Beaufort County
Total Housing Units	45,980
Single-Family Detached Units (%)	49.9%
Townhouses (%)	7.2%
Duplexes (%)	1.9%
Multi-family Units (%)	25.5%
Mobile Homes (%)	14.5%
Other Housing Units (%)	1.0%
Median Value	$112,100
Median Contract Rent	$423
Homeowner Vacancy Rate	3.5%
Rental Vacancy Rate	36.4%

Source: U.S. Bureau of the Census 1992.

The median value of owner-occupied housing units is $112,100 for Beaufort County as a whole. However, the county's median value is greatly impacted by housing prices on Hilton Head Island where the median value of owner-occupied housing units is $200,800.

These high-priced units increase the county's overall median price levels. Housing in other portions of Beaufort County are much more affordable (U.S. Bureau of the Census 1992).

As reported in the *1990 Census of Population and Housing*, the median contract rent in Beaufort County is $423. According to the *Rental Housing Market Analysis* prepared in 1994 for the Military Enhancement Committee, the median contract rents range between $413 and $700 for single-family rentals in various communities in Beaufort County, excluding Hilton Head Island. For the same area, median contract rents for units in multi-family buildings range between $322 and $554 per month depending on the number of bedrooms and bathrooms in each unit (CPC/ForeSite n.d.).

Taxes and Revenues

Beaufort County raises the majority (81.3%) of its total revenue from local sources, with the remainder of its revenue coming from the state or federal government. Property tax is the single largest revenue source, accounting for approximately 66% of the county's total revenue. Beaufort County levies an ad valorem tax on real and personal property at a rate of 195.7 mills on the dollar of assessed value. This millage rate includes both the county and school property tax levies. Special districts within the county (e.g., the Bluffton Fire District) also have the right to levy additional property taxes. In addition to property taxes, Beaufort County also raises a portion of its revenue through charges for services, licenses and permits, fines and forfeitures, and interest on investments. During FY 1995-96, Beaufort County raised approximately $129 million from its major revenue sources (County Council of Beaufort County 1995).

The county government's total current expenditures reached nearly $43 million for FY 1995-96 and an additional $82 million was transferred to other local agencies, principally the Beaufort County Public School District and local fire departments. The Beaufort County Public School District's annual budget is approximately $63 million, or nearly 46% of the total Beaufort County budget. Other major expenditures include public safety/police protection (10.4%), public works (7.5%), general government (7.3%), public health (3.1%), and culture and recreation (2.7%) (County Council of Beaufort County 1995).

3.2.5.2 Community Services

Fire and Emergency Services

The MCAS Beaufort Fire Department provides all fire suppression, fire prevention and emergency medical services on-station and at the Laurel Bay Family Housing Area. The department also responds to all Hazardous Materials (HAZMAT) situations at the station, Laurel Bay Family Housing Area, MCRD Parris Island, and Naval Hospital Beaufort. Typically the station responds to 300 calls a year (Kennedy 1996).

The MCAS Fire Department has a total of 27 fire fighting personnel which staff two fire stations. One station is located on MCAS Beaufort, the other station is located in the Laurel Bay Family Housing Area. The department has a total of two engine companies (one in each station) that are both staffed by four-person crews. One supervisor for the entire department is on-duty at all times. In addition to these structural fire fighting facilities, crash vehicles, which are operated by a separate department, are located at the airfield in the event of an aircraft accident (Kennedy 1996).

Five fire districts located in Beaufort County are controlled by the Beaufort County Council: Bluffton Fire District, Burton Fire District, Daufuskie Island Fire District, Lady's Island/St. Helena Fire District, and Sheldon Fire District. These fire departments operate a total of 18 fire stations scattered throughout Beaufort County. Most of Beaufort County's fire departments are staffed by a combination of professional and volunteer fire fighters. These fire departments have 105 paid fire fighters and 55 volunteer fire fighters in total (Land Ethics, Inc. 1996).

Security Services

MCAS Beaufort Provost Marshall's Department provides all on-station security services. The department is responsible for checking clearance at all operating gates, issuing passes, and responding to any security incidents at MCAS Beaufort or at the Laurel Bay Family Housing Area. In addition, MCAS Beaufort has mutual aid agreements with both Beaufort and Jasper counties (Sontage 1996).

The MCAS Beaufort Provost Marshall's Department has a total of 104 security personnel. In FY 1996, the department investigated approximately 580 incidents. The majority of these calls concerned larcenies and animal incidents. In addition, the security department issued approximately 3,550 vehicle passes and approximately 4,000 visitor passes in the past year (Sontage 1996).

Off-station security services in Beaufort County are provided by the Beaufort County Sheriff's Department. The department has a total of 120 full-time personnel and 26 additional deputies (Beaufort County 1996). Typically the department responds to approximately 59,000 calls a year, investigates 15,000 cases, and serves approximately 5,900 judgments a year (County Council of Beaufort County 1995).

In addition to the Sheriff's Department, some of the local municipalities have police departments that supplement the Beaufort County Sheriff's Department. For example, the City of Beaufort Police Department has a total of 40 personnel and 38 equipped vehicles (South Carolina Department of Commerce n.d.).

Medical Services

Active-duty military personnel receive outpatient care at the Branch Medical Clinic which is located on MCAS Beaufort. In addition to providing outpatient services, the clinic also conducts first aid, CPR, and food handling classes for MCAS Beaufort personnel and supplies Emergency Ambulance Services to the Pine Grove and Laurel Bay housing areas. The Branch Medical Clinic has a total of 66 military personnel and completes approximately 9,040 outpatient visits a year.

In-patient care requiring specialized treatment or consultations is handled by the Naval Hospital Beaufort. The hospital also serves any medical emergency occurring on-station or in the Laurel Bay Family Housing Area when the Branch Medical Clinic is not open. A new regional naval hospital is planned for construction during FY 2000. This new facility is designed to replace Naval Hospital Beaufort, located on Port Royal Island, and to address any current deficiencies at the hospital or at the Branch Medical Clinic.

Medical services in Beaufort County are provided by two general hospitals (Beaufort Memorial Hospital and the Hilton Head Hospital), seven public health centers, and one adult/adolescent alcohol and drug abuse treatment center. Additionally, more than 210 physicians and 35 dentists practice in Beaufort County.

Recreational Facilities

The MCAS Beaufort Morale, Welfare, and Recreation Department provides a full range of recreational facilities and services to military personnel, military dependents, and civilian employees. The facilities available on-station and at the Laurel Bay Family Housing Area include a bowling alley, a driving range, an auto hobby shop, a gym and fitness center, athletic fields, tennis courts, racquetball courts, swimming pools, fitness trails, a library, an

officers club, a combined NCO club, an enlisted club, a community center, a theater, and a youth center (Wilson 1996).

In addition to recreational facilities provided at MCAS Beaufort, there is also a wide variety of parks and recreational activities available in the local community. Beaufort County maintains 13 public parks, which have athletic fields, playground equipment, and boat access ramps. In addition, the county maintains a gymnasium and a municipal swimming pool in downtown Beaufort.

Education

Elementary school-age military dependents who reside in the Laurel Bay Family Housing Area or in other on-station housing at MCAS Beaufort attend Department of Defense (DoD)-controlled schools. Any elementary student residing on a government installation in Beaufort County may attend these schools. Middle school- and high school-age dependents living in these housing areas attend Beaufort County Public Schools (Silvester 1996).

The DoD operates two elementary schools located in the Laurel Bay Family Housing Area: a primary school for pre-kindergarten to Grade 2 and an intermediate school for grades 3 to 6. Total student enrollment at these schools is 687 students and 575 students, respectively (Silvester 1996).

Both of the DoD schools at the Laurel Bay Family Housing Area are currently operating at capacity. In an attempt to alleviate overcrowding situations, the primary school utilizes eight portable classrooms, and the intermediate school utilizes four portable classrooms. If the proposed construction of 280 or more family housing units at the Laurel Bay Family Housing Area is completed, additional classroom facilities and teaching staff will be needed to accommodate the resulting increase in school-age children eligible to attend the DoD schools (Silvester 1996). Two sites for school replacements/additions at the Laurel Bay Family Housing Area have been identified in the MCAS Beaufort Master Plan. Replacement of the primary school has been proposed as part of the MILCON program for the 280 family housing units.

Middle school- and high school-age students that reside in MCAS Beaufort housing and the majority of military school-age dependents who reside off-station, attend the Beaufort County schools. The district operates a total of 19 public schools: 13 primary and elementary schools, three middle schools, and three high schools. These schools are divided into three clusters based on the residential locations of the student body. These clusters include the Battery Creek Cluster of Schools, the Beaufort Cluster of Schools, and the Hilton Head Cluster of Schools (Beaufort County School District n.d.).

As of September 11, 1995, nearly 14,640 students (approximately 90% of the total student population in the county) were enrolled in the Beaufort County School System. In the last ten years total enrollment at the schools has increased by 37%. Large gains in enrollment have become commonplace; the district gains between 400 and 500 students per year. Since 1988 the district has constructed six new schools and has completed significant renovations and expansions of another ten schools (Beaufort County School District n.d.).

During the 1994 school year, the most recent year for which capacity data have been gathered, Beaufort County Schools were operating at 15% over the total design capacity of the buildings. Eight of the nineteen schools were operating with overcrowded conditions, and more than 12% of the districts' students were being taught in 84 mobile classrooms (Beaufort County 1996).

The Beaufort County School Board predicts that the total school-age population will increase by 46% over the next 10 years. This projected growth is expected to include a 38% increase in elementary school students; a 36% increase in the number of middle school students; and a 73% increase in the number of high school students by the year 2006 (Beaufort County 1996).

In 1995, the Beaufort County School District had an average of 245 military dependents who lived on federally owned property attend its schools. These federally connected students were all middle school- or high school-age (the elementary school children attended the DoD schools located in the Laurel Bay Family Housing Area). In addition to these students, the Beaufort County Public Schools were attended by 953 students who lived in private accommodations but had at least one parent in the military (Thurmond 1996).

As a result of the current overcrowding and the projected increase in the school-age population, a $122 million bond referendum was passed in May 1995, which has allowed the school district to initiate a major building and renovation program. Under this program, eight new schools (four elementary schools, three middle schools, and one high school) will be added in the near future to replace existing inadequate facilities; three elementary schools will receive major renovations/expansions, and six schools will receive major repairs/completions over the next five years. The total size of the buildings operated by the school board will increase by more than 933,000 square feet (Beaufort County 1996).

The current general fund budget for the school district is $62.9 million. This figure equates to approximately $4,690 per pupil. The bulk of this expenditure (70%) goes for instruction and plant operations (11%). The remaining 19% is divided among school administration, food for students, district administration, and transportation (Beaufort County School District n.d.).

3.2.6 Infrastructure and Utilities

3.2.6.1 Water Supply

MCAS Beaufort

Water is supplied directly to MCAS Beaufort and the Laurel Bay Family Housing Area by the Beaufort-Jasper Water and Sewer Authority (BJWSA). On average, BJWSA delivers 0.35 MGD of water to MCAS Beaufort (Galloway 1996). Potable water is delivered to the station through a 16-inch main and a 250,000-gallon storage tank just outside MCAS Beaufort. Service into MCAS Beaufort is via a 12-inch main and eventually is distributed throughout MCAS Beaufort through eight- and ten-inch lines.

MCAS Beaufort operates a combined potable water and fire protection system. Currently, the station has a 300,000-gallon and 500,000-gallon storage tank. The 300,000-gallon aboveground storage tank is supplied with raw water pumped from three 12-inch wells. The tank system is designed as a back-up water system; however, because the system is not equipped for water treatment, it is not a potable water source. For fire fighting, the station maintains a 500,000-gallon underground storage tank and four 2,000-gpm fire pumps; but because of minimum flow and residual pressure problems, the system is inadequate for fire protection throughout the station. For example, in Buildings 418, 594, 728, and 729, flow pressure inadequacies are being augmented through the installation of a fire protection foam system (Tisdale 1996).

To ensure a potable water supply and adequate flow pressure for fire fighting, a contract has been awarded for an equipment upgrade for the 300,000-gallon storage tank and to construct a new 500,000-gallon elevated storage tank. These upgrades are scheduled to be in-service in late 1997. The intent of the project is not to eliminate the use of the BJWSA's water supply system, but to increase flow pressure and develop water treatment capabilities (Galloway 1996). Future projects also include the construction of a dedicated main to service flight line facilities for fire fighting (Jackson 1996).

BJWSA provides potable water and water for fire protection to the Laurel Bay Family Housing Area via a 12-inch main connected to a 250,000-gallon elevated storage tank on site. A system of 3-inch to 12-inch pipes extends throughout the developed portions of the Laurel Bay Family Housing Area.

Regional Systems

Water services in Beaufort County are provided by approximately 16 public and private agencies (retailers). Virtually all agencies receive water from the Savannah River that, prior to receiving, is treated and distributed by the BJWSA.

The BJWSA has one surface water treatment plant capable of treating 16 MGD of raw water. The BJWSA is permitted to withdraw approximately 50 MGD from the Savannah River. Current demand for water from the system is approximately 10 MGD in the summer and 7 MGD in the winter (Smith, L. 1996).

3.2.6.2 Wastewater System

MCAS Beaufort

MCAS Beaufort maintains a system of gravity mains, force mains, and pumping stations for conveyance of wastewater to the wastewater treatment plant. The plant has a 1.0 MGD design flow capacity with an average flow rate of 0.30 MGD. The plant has a bar screen, grit chamber, primary and secondary clarifiers, trickling filter, aerobic sludge digestion system, two sludge drying beds, a chlorinator, chlorine contact chamber, flow meter, and sampler. In January 1996, the digestive system was changed from anaerobic to aerobic, and blowers were added to increase air flow. Other recent upgrades to the system include repairs to the grit chamber (Galloway 1996).

Effluent from the treatment plant is discharged just south of Geiger Boulevard into a tributary of Albergotti Creek. The quantity and quality of effluent discharged by MCAS Beaufort is regulated under its National Pollutant Discharge Elimination System (NPDES) Permit SC000082501, outfall 001, which was renewed by the South Carolina Department of Health and Environmental Control (SCDHEC) in 1994 and expires in 1998. The NPDES permit allows for a maximum effluent discharge of 0.75 MGD; however, due to in-flow/infiltration problems during periods of heavy rain, the discharge quantity sometimes exceeds the permit limit.

The Laurel Bay Family Housing Area has its own wastewater treatment plant. The plant contains a communitor; bar screen; gravity grit changer; primary and secondary clarifiers; trickling filters; aerobic digester; sludge drying beds; and facilities for chlorination, sampling, and flow monitoring (SOUTHDIV 1994). There are no lift stations in the collection system at Laurel Bay; the sewer system is gravity fed. The treatment plant has a

design capacity of 1.0 MGD; flow volumes currently average 0.5 MGD (SOUTHDIV 1994). Under NPDES Permit SC000082502, effluent discharges to the Broad River.

Regional Systems

Wastewater treatment within Beaufort County is provided by municipalities, military installations, home owners, service districts, and BJWSA. Treatment of wastewater is accomplished through septic tanks, package treatment plants, and wastewater treatment plants. Public sewer service is currently available to approximately 15% of the unincorporated population, with the remainder of the county residents using individual septic tanks (Land Ethics, Inc. 1996).

The BJWSA maintains seven wastewater treatment facilities consisting of three activated sludge treatment plants and four lagoon systems. Six of these systems rely on effluent discharge through spray irrigation. The seventh plant is permitted to discharge directly into the Beaufort River. In total, the treatment plants currently discharge approximately 0.65 MGD of effluent. All the plants are operating at 50% or less of their rated capacity; however, 75% of the treatment facilities have their remaining capacity reserved for future development. Because of reserved capacity, BJWSA maintains wastewater system design and expansion plans to meet future demand (Petry 1996).

Septic tank systems are still used throughout the county, although the Natural Resources Conservation Service indicates that 60% of the county is considered unsuitable or severely limited for individual septic tanks systems. Package wastewater treatment plants have also been widely used throughout the county. Most of the package treatment plants operating in the county were constructed between 1950 and 1986 and generally experience problems due to age and inconsistent maintenance (Land Ethics, Inc. 1996).

3.2.6.3 Stormwater

Stormwater runoff from surfaces at MCAS Beaufort is directed into a network of pipes and open culverts which principally drain to the south (Albergotti Creek) and east (Brickyard and Mulligan creeks). Stormwater from the Laurel Bay Family Housing Area is discharged to Broad River, Whale Branch, and an unnamed tributary. MCAS Beaufort uses a system of oil and water separators in industrial and maintenance areas to reduce potential stormwater pollutants. Also, in an effort to reduce pollutants and downstream runoff flow rates, an 11-acre stormwater retention pond will be constructed southeast of the aircraft storage and maintenance facilities (Sinclair 1996). A Stormwater Pollution Prevention Plan for MCAS Beaufort was completed in January 1995.

Stormwater discharges are permitted under NPDES Permit SCR001845. Under the permit, analytical monitoring of the discharge points is not required because of SCDHEC nonexposure exclusion provisions. However, MCAS Beaufort is required to perform visual evaluations of the discharge quality on a quarterly basis.

3.2.6.4 Electrical

South Carolina Electric & Gas (SCE&G) supplies power to MCAS Beaufort via a 115-kV electric transmission line to a substation located in the core area. The substation has a 10.5 megawatt capacity transformer. From the substation, power distribution throughout the station occurs through four overhead 12.5-kV electric distribution lines. Tie-switches are located at the switching station and three other locations.

In 1996, the station had a peak demand of 9 megawatts, with a 1.5 megawatt available capacity at the substation (Hager 1996). In case of electrical failure the station has diesel generators to provide back-up power. The electrical distribution system is scheduled to be inspected and a load capacity analysis is to be completed in 1997 (Webb 1996).

Electrical power for the Laurel Bay Family Housing Area is also provided by SCE&G. Overhead lines provide most of the service to the developed portions of the housing area from an on-site substation. Mobile homes are serviced by underground lines.

3.2.6.5 Heating

The primary heating source for MCAS Beaufort is the station's central heating plant, located in Building 426. The plant consists of two International high-temperature hot water (HTHW) boilers, each with a capacity of 40,000,000 BTUs per hour. The boilers burn No. 6 oil and natural gas. A propane back-up system can be used in cases of emergency. The system generates hot water at 300°F under 200 to 225 psi. From the central plant, the HTHW distribution system covers the majority of the core area and extends southeast along Geiger Boulevard to supply, storage, and operation areas. The primary use of the HTHW distribution system is for domestic hot water and low temperature heated water. Other boilers located throughout the station are fueled by No. 2 oil or a combination of No. 2 oil and natural gas and principally generate hot water and some steam.

System improvements have included the installation of a high-pressure injection pump and a reduction in the pH level to minimize internal corrosion damage to the chemical feed system at the central plant. In addition, the replacement of the ball-type isolation valves in the HTHW distribution system with gauge values is scheduled to be completed in 1997 (Tisdale 1996).

Space and hot water heating at the Laurel Bay Family Housing Area is provided by SCE&G via natural gas distribution lines.

3.2.6.6 Jet Fuel

Aircraft fuel is shipped to MCAS Beaufort via barges to the station's fuel pier on Brickyard Creek. It is then transported to the station's tank farm located along Quilali Road. The tank farm has two 567,000-gallon (2,150-kiloliter) storage tanks that are connected to two tanks in the vicinity of the flight line. With the recent installation of 3,200 linear feet of a 16-inch underground fuel line between storage tanks 401 and 402 (each having a 210,000-gallon [795-kiloliter] capacity) and the west hot-engine refueling pits, the jet fuel system at the station has been substantially improved. First, jet fuel can now be transported via pipeline to storage tanks 401 and 402, or as previously conducted, transported by railroad tank car or truck. Secondly, the west fuel pit can be directly served by storage tanks 401 and 402; whereas previously, fuel was transported to the east pit, then along the flight line to the west pit. Finally, with direct fuel supply to the west pit, aircraft fueling times are reduced. Other recent improvements include the addition of pit number nine to serve large body aircraft and the modification of pit number four to service both large body and fighter aircraft (Galloway 1996).

3.2.6.7 Solid Waste Management

Approximately 3,650 tons (3,311 metric tons) of solid waste was generated at MCAS Beaufort, Naval Hospital Beaufort, and the Laurel Bay Family Housing Area during FY 1995. Of the total tonnage, approximately 39.7% or 1,450 tons (1,315 metric tons) was generated at MCAS Beaufort. Solid waste generated at the station is handled by a private contractor and disposed of at the Hickory Hill landfill located approximately 17 miles (27 km) from the station in Jasper County. There are no active landfills at MCAS Beaufort (Melton 1996).

The Hickory Hill landfill is a privately-owned, RCRA Subtitle D permitted landfill. Of the approximately 230,000 tons (208,652 metric tons) of solid waste received by the landfill each year, 125,000 tons (113,398 metric tons) come from Beaufort County. Currently, the landfill has projected capacity for 12.5 years; however, application/approval for vertical expansion to the landfill is 65% complete. With approval of the vertical expansion, the landfill would be expected to operate for the next 32 years (Gibbons 1996).

On-station recycling is managed by the Natural Resources and Environmental Affairs Office. The program includes curbside pick-up for material such as aluminum cans, newspaper, glass (clear, brown, green), plastic, and tin cans. During FY 1995, 81.44 tons (74

metric tons) of these materials were recycled, resulting in a 6.49% average monthly reduction in solid waste sent to the landfill. Total solid waste recycling efforts at the station, including curbside pick-up, for FY 1995 accounted for approximately 294 tons (267 metric tons) of material recycled. However, at the current recycling rate, MCAS Beaufort will not meet the state's 1997 goal of 25% reduction in solid waste deposited at landfills (Melton 1996).

3.2.7 Transportation

3.2.7.1 Regional Road Network

MCAS Beaufort is serviced by a system of federal and state roadways. The large number of waterways and the prominence of wetlands in the area have historically influenced the location of major roads. U.S. 21 is a four-lane highway connecting Colleton County to the north and running east of MCAS Beaufort, through the City of Beaufort and south through Hunting Island on the Atlantic Coast. In addition to being the major thoroughfare providing access to the station, this road is the major north-south connector in Beaufort County and carries the majority of truck and tourist traffic in the area.

There are three other primary roads within the region that could be affected by realignment at the station. South Carolina (SC) 116 is a two-lane road which runs from the Laurel Bay Family Housing Area to the base. SC 170 is a critical two-lane connection from U.S. 278 to the southwest to U.S. 21, south of the base. SC 280 is a two-lane road which carries traffic from the southern part of Port Royal Island, near MCRD Parris Island, to U.S. 21 south of MCAS Beaufort. The regional road network is depicted on Figure 3.2-12.

3.2.7.2 Station Road Network

The primary road providing access to areas on the station is Geiger Boulevard. Longstaff Avenue, Kimes Avenue, and Delalio Avenue are the other east-west roads providing access throughout the core area of the station. Drayton, Gordon and Elrod streets provide the major north-south circulation for the core area. Other perimeter and access roads connect support and housing facilities to the station road network.

There are a total of five gates providing access to MCAS Beaufort. Three of these gates are two-lane auxiliary gates utilized exclusively by the station's security personnel and occasionally for specialized deliveries. One other gate is used for specialized deliveries and infrequent access and egress to the northwestern portion of the station. The main gate, a four-lane entrance located on Geiger Boulevard/SC 116, is operated 24 hours a day by base

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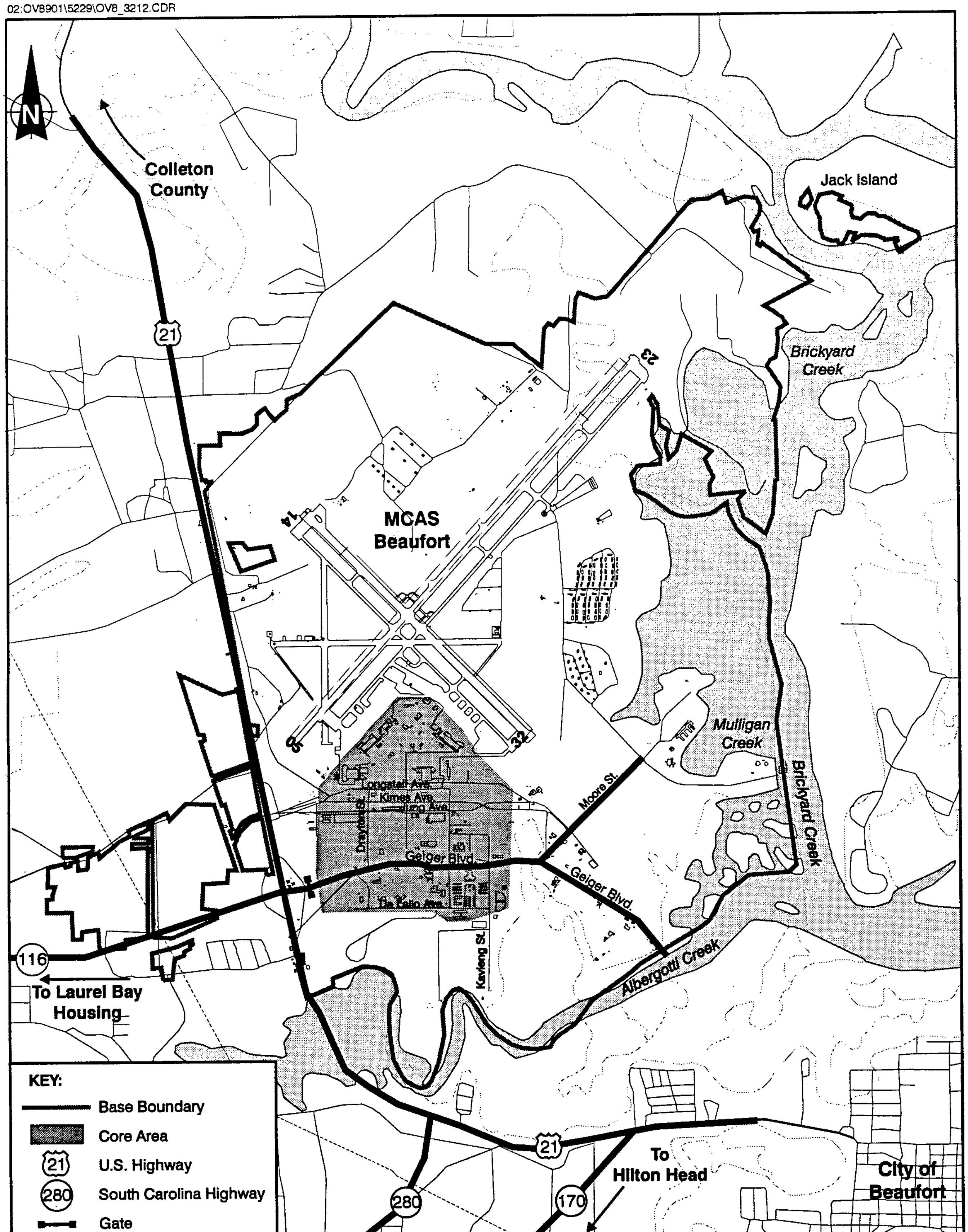


SOURCE: SCDOT 1996

SCALE

0 1,075 2,150 Meters

0 3,527 7,054 Feet

Figure 3.2-12 ROADWAY NETWORK SURROUNDING MCAS BEAUFORT

security personnel. This road carries the majority of traffic generated to and from the station during the average day.

The Laurel Bay Family Housing Area is accessed through a gate on SC 116. On-site circulation is provided by a network of neighborhood streets.

3.2.7.3 Existing Traffic Conditions

In general, roadways in the vicinity of MCAS Beaufort are operating at acceptable LOSs (a discussion of LOSs is provided in Section 3.1.7.3). SC 117 and SC 280, servicing traffic coming from the south and southwest, generally experience more congested service levels. This is because these two-lane rural roads carry substantial loads of traffic to and from portions of southern Beaufort County (e.g., Hilton Head). Table 3.2-6 and Figure 3.2-13 display AADT traffic volumes and LOSs for the roads in the vicinity of the station.

3.2.7.4 Planned Road Improvements

SCDOT has identified roadways with existing and projected deficiencies requiring improvement. The SCDOT Transportation Improvement Plan (STIP) identifies nine projects within Beaufort County, five of which will facilitate improved traffic flow in the region influenced by MCAS Beaufort:

- Expansion of U.S. 21 from a two-lane road to a four-lane, flush-median road from Woods Memorial Bridge to Chowan Creek Bridge and from Chowan Creek Bridge to SC 517;

- Widening the two-lane, high-volume section of SC 170/U.S. 278 between Career Education Center and McGarvey's Corner to a four-lane, divided highway with an elevated median; and

- Widening of the SC 170 roadway from the existing two-lane roadway to a four-lane roadway, including the widening of SC 170 bridge over the Broad River. This project has three separate components affecting the segments between the Career Education Center and SC 280.

These improvements are projected to alleviate congestion problems expected for the area in the vicinity of the station (SCDOT 1996).

3.2.8 Noise

The main source of noise at MCAS Beaufort is aircraft operations, such as take-offs, landings, and touch-and-go operations. The last official aircraft noise analysis was conducted

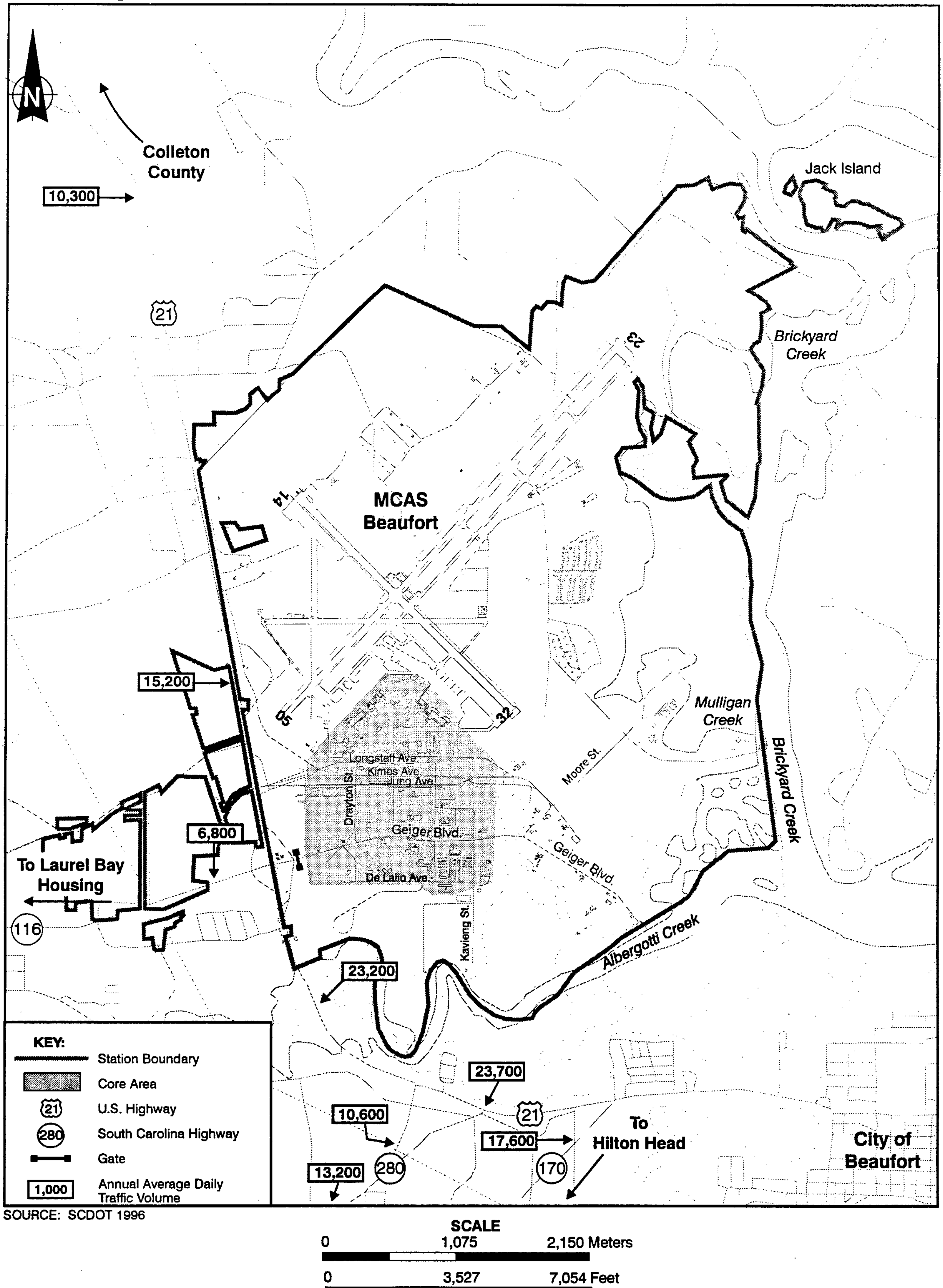
Table 3.2-6 EXISTING[a] TRAFFIC AND LEVELS OF SERVICE FOR ROADS IN THE VICINITY OF MCAS BEAUFORT			
Roadway	**Segment**	**AADT**	**LOS**
US 21	S 71 to S 38	10,300	B
US 21	SC 116 to S 71	15,200	B
US 21	SC 280 to SC 116	23,200	B
US 21	SC 170 to SC 280	23,700	B
SC 116	Laurel Bay Family Housing Area to US 21	6,800	B
SC 170	SC 170/S20 to SC 280	13,200	C
SC 170	SC 280 to US 21	17,600	F
SC 280	SC 23 to SC 170	13,400	C
SC 280	SC 170 to US 21	10,600	B

[a] 1996 figures.

Key:

A = Free-flow conditions.
AADT = Average annual daily traffic.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds; however, low maneuverability.
E = Traffic at capacity of segment. Unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
LOS = Level of service.
SC = South Carolina State Road.
US = United States Highway.

Source: SCDOT 1996.



SOURCE: SCDOT 1996

Figure 3.2-13 EXISTING TRAFFIC CONDITIONS ON ROAD SEGMENTS IN THE VICINITY OF MCAS BEAUFORT

in 1994 to establish AICUZ boundaries, which are set forth in the base Master Plan (SOUTHDIV 1994). This analysis used the ABD technique to calculate noise exposure because it best reflects the intermittent nature of airfield operations at the station (i.e., very busy periods interspersed with periods of little activity) and is more representative of the noise exposure at MCAS Beaufort. A full discussion of relevant noise measurements is presented in Section 3.1.8.

The station periodically conducts aircraft noise studies to assess aircraft noise exposure in the vicinity of the installation. The most recent study was conducted in 1997 (Wyle Labs 1997). This study also used the ABD techniques because it best reflects the environment at MCAS Beaufort and is consistent with the previous analysis. A comparison of the existing AICUZ and 1997 modeled noise contours is presented in Figure 3.2-14. Because airfield operations at the station were at an historic low in 1994, noise contours in 1994 were less extensive than those in 1997. The 1997 contours represent a "snap-shot" in time. Differences between 1997 and the existing AICUZ contours can be attributed to differences in runway utilization, overall aircraft operations, and the type of operations (e.g., arrivals, departures, touch-and-go, FCLP).

In order to estimate the population within each respective AICUZ noise contour, the contours were overlaid on a GIS database containing population data as reported in the *1990 Census of Population and Housing*. Although Beaufort County's population is estimated to have grown nearly 20% between 1990 and 1995 (see Section 3.2.5), the 1990 census is used in all noise analyses in this DEIS for the purpose of consistency. Table 3.2-7 presents the total area within each AICUZ contour and the estimated population within the contour.

At MCAS Beaufort, noise-sensitive receptors located near the airfield include several religious facilities (see Figure 3.2-14). No schools are located within the 65 Ldn or greater noise contours.

3.2.9 Air Quality

3.2.9.1 Air Quality Regulations

Federal air quality regulations discussed in Section 3.1.9.1, except for the General Conformity Rule (Section 3.1.9.2), are applicable to MCAS Beaufort. The station is located in an air quality attainment area for all criteria pollutants; therefore, there are no major air quality issues, such as nonattainment and maintenance plans, affecting MCAS Beaufort.

Table 3.2-7

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1994 AICUZ AND 1997 NOISE CONTOURS MCAS BEAUFORT

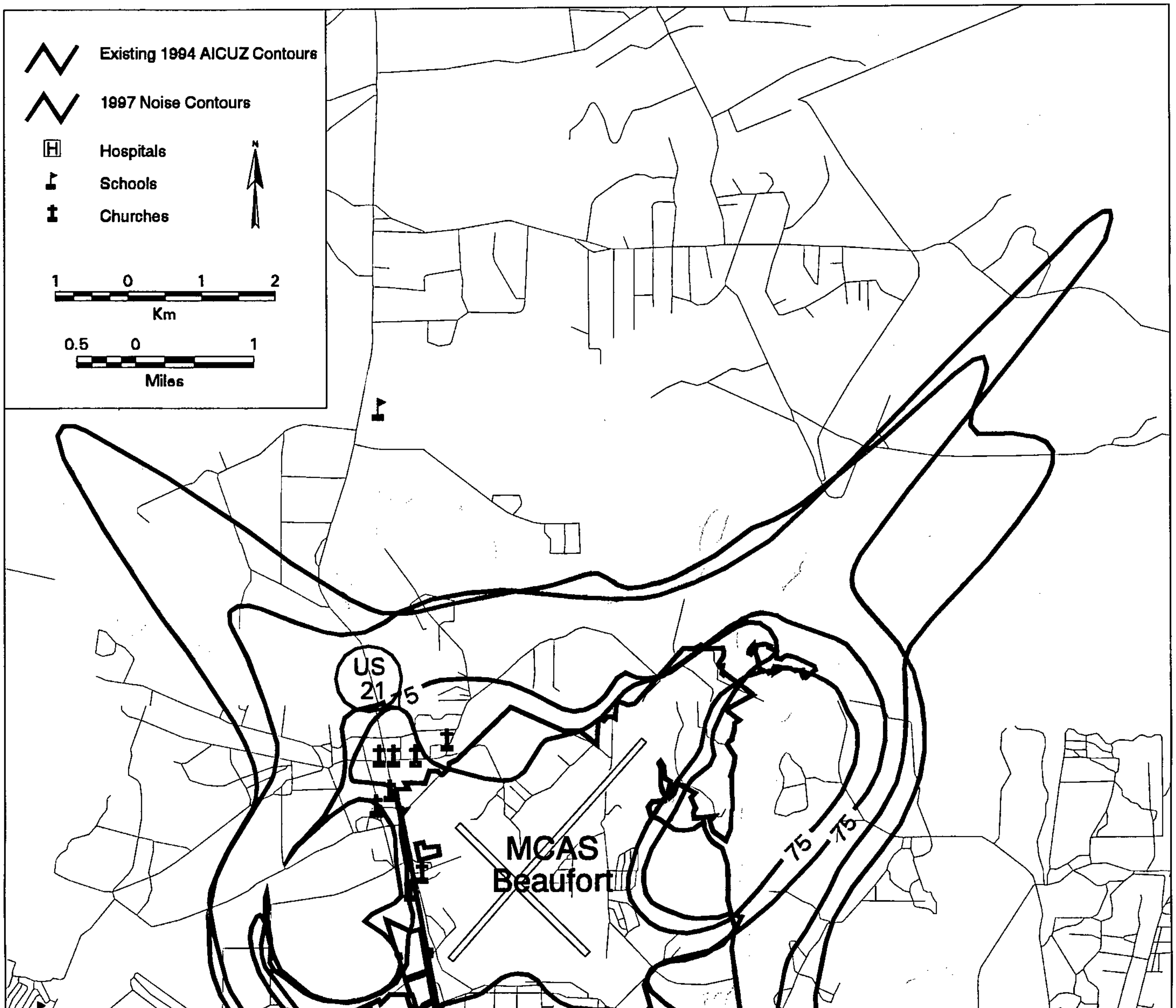
	1994 AICUZ		1997 Noise Contours	
Ldn	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	8,409 (3,403)	2,847	9,938 (4,022)	3,440
75 dB or greater	1,028 (416)	317	1,190 (482)	362
Total	9,437 (3819)	3,164	11,128 (4,503)	3,802

Note: Numbers exclude water areas.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.



Source: SOUTHDIV 1994; Wyle Labs 1997

Figure 3.2-14
AICUZ and 1997 Noise Contours - MCAS Beaufort

The two major permitting programs, one for new source construction above applicable thresholds (the Prevention of Significant Deterioration [PSD] program) and one for operation of air emission sources (the Operating Permit program) have been delegated to SCDHEC because it has in place procedures that meet the criteria developed by the federal government to implement these federal programs.

For New Source Review permitting (i.e., PSD), the base is located at the edge of an area within which sources may impact a Federal Class 1 air quality area (Cape Romain National Wildlife Refuge). Any source at the base that would trigger PSD may be required to perform an impact analysis for Cape Romain.

SCDHEC regulates toxic air pollutants through SCDHEC Standard No. 8. This regulation requires a thorough analysis and permitting of any toxic emissions above thresholds specified in the regulation.

MCAS Beaufort has submitted a Title V operating permit application covering three boilers, one auxiliary power unit test stand, three jet engine test locations (two open test stands and one enclosed test cell), and 16 emergency power generators. All other stationary sources at the base may operate without the need to be explicitly included in the operating permit at this time. MCAS Beaufort's estimates of VOC emissions due to aircraft painting initially used the painting requirements for nine squadrons, two more than are currently at the base. MCAS Beaufort amended their Title V application in April 1996 to include expanded maintenance painting activities due to changes in Navy and Marine Corps maintenance painting of aircraft returning from aircraft carrier deployments.

Construction and operation of any sources to which permit rules apply must comply with any emission or ambient air quality standards.

3.2.9.2 General Conformity

The General Conformity Rule, is described in Section 3.1.9.2. The rule exempts federal actions occurring in attainment areas or actions that have no air quality impacts in nearby nonattainment areas. Because the entire State of South Carolina is in attainment for all criteria pollutants and there are no nearby nonattainment areas, any federal action at the base that generates emissions of criteria pollutants is exempt from the General Conformity Rule.

3.2.9.3 Existing Emissions at MCAS Beaufort

MCAS Beaufort submitted a required emission inventory report for emissions during calendar year 1993 (Radian 1994). SCDHEC Regulation 6.2.1, Section III, requires submittal of an emission inventory in every even calendar year thereafter, beginning in 1996. The next

report will be submitted during 1997 for calendar year 1996 emissions. This report was not available prior to completion of this DEIS.

The stationary source emission inventory included in MCAS Beaufort's Title V operating permit application contained changes from the 1993 inventory (Radian 1996). This information was used in this DEIS to update the 1993 emission inventory.

Existing aircraft emissions from flight operations and maintenance run-up engine testing are based on aircraft flight operation and testing data used for noise analyses (Wyle Labs 1997). These noise analyses use a base year of 1997.

Family housing at MCAS Beaufort is located in two areas: the main base area and the Laurel Bay Family Housing Area.

Aircraft Emissions from Flight Operations

Aircraft engines emit VOCs, NO_x, CO, SO_2, and PM_{10}. Aircraft emissions for 1997 were estimated using the same methods and emission factors for F/A-18 aircraft described in Appendix E. Aircraft operation data were taken from the 1997 aircraft noise study (Wyle Labs 1997). Aircraft operations account for annual emissions of approximately 112 tons of VOC emissions and 95 tons of NO_x emissions in 1997.

Other Mobile Sources

In-frame jet engine testing emissions in high-power run-up areas along the flight line were estimated from the number of projected 1997 run-ups modeled in noise studies (Wyle Labs 1997). These tests account for annual emissions of 6 tons of VOCs and 10 tons of NO_x in 1997.

Stationary Sources

The latest available comprehensive air pollutant emission inventory for MCAS Beaufort was completed in 1993 (Radian 1994) and updated in 1995 (Radian 1996). This emission inventory includes emission estimates for stationary sources only.

MCAS Beaufort's stationary sources fall into three main categories: bulk fuel terminal operations involving the storage and transfer of fuel; operation of steam and hot water boilers; and maintenance operations on aircraft including painting and out-of-frame engine testing (Radian 1996). Stationary sources at the Laurel Bay Family Housing Area consist of boilers; small fuel storage tanks; and small, emergency electric generators driven by diesel engines.

MCAS Beaufort operates 13 boilers burning either No. 2 fuel oil or natural gas. The two largest boilers are located in the public works boiler house. Fuel storage tanks are scattered throughout the base. These tanks store gasoline, No. 2 and No. 6 fuel oil, jet fuel, waste oil, and propane. The primary emissions from storage tanks are VOCs.

Two natural gas boilers are located at the Laurel Bay Family Housing Area. There is one emergency electric generator at Laurel Bay, as well as five storage tanks (one empty, two storing No. 2 oil, and two storing gasoline).

Aircraft-associated equipment maintenance activities generate air pollutant emissions. Sources involved in these activities include parts cleaners using a degreasing solvent, welding, surface coating of aircraft and other GSE, and out-of-frame jet engine testing in test cells.

Other miscellaneous sources in operation at the base include auxiliary electrical power generators, emissions from fire fighting training activities (including practice for structural fire fighting and aircraft accidents), and VOC emissions from wastewater treatment, carpentry, ordnance destruction and processing, a composite materials grinding booth, and photography laboratory.

MCAS Beaufort stationary sources accounted for 24 tons of VOC emissions and 59 tons of NO_x emissions in 1995. Laurel Bay Family Housing Area stationary sources accounted for 0.02 ton of VOC and 1.2 tons of NO_x in 1995.

3.2.9.4 Total Existing Emissions

The total existing emissions at MCAS Beaufort and Laurel Bay Family Housing Area are shown in Table 3.2-8. These include 142 tons of VOCs, 164 tons of NO_x, 451 tons of CO, 20 tons of SO_2, and 61 tons of PM_{10} emitted annually at MCAS Beaufort. Emissions from Laurel Bay Family Housing Area sources were 0.03 ton of VOCs, 1.2 tons of NO_x, 0.3 ton of CO, 4.2 tons of SO_2, and 0.06 ton of PM_{10}.

3.2.10 Topography, Geology, and Soils

3.2.10.1 Topography

The topography of MCAS Beaufort is generally flat to slightly rolling. Topographic elevations at the station range from Mean Sea Level (MSL) to 37 feet (11.3 meters) above MSL. Most of the developed portions of the station are roughly 15 feet (4.6 meters) above MSL. Low lying areas are generally along the station's eastern boundary near salt marshes along Brickyard, Mulligan, and Albergotti creeks (SOUTHDIV 1994).

Table 3.2-8

EXISTING[c] AIR EMISSIONS SUMMARY FOR MCAS BEAUFORT AND THE LAUREL BAY FAMILY HOUSING AREA
(tons per year)

Source Type	VOCs	NO_x	CO	SO_2	PM10
Mobile Sources					
Aircraft[d]	111.8	95.1	311.7	4.6	48.1
Other Mobile Sources					
Maintenance Run-ups	6.35	9.7	15.7	0.30	3.76
Total Mobile and Other Mobile	118.2	104.8	327.4	4.9	51.9
Stationary Sources					
Boilers	0.18	9.89	2.14	13.00	1.32
Generators	1.29	6.14	26.46	0.40	0.43
Engine Test Cells[d]	6.52	42.70	98.00	2.51	6.48
JP-5 Storage[a]	3.60	0	0	0	0
Degreasing	8.88	0	0	0	0
Painting	3.53	0	0	0	0.07
Open Burn/Detonation[b]	0.08	0.03	0.08	0	0.07
Carpentry	0.00	0	0	0	0.48
Total Stationary	24.1	58.8	123.4	15.0	8.85
Total (MCAS Beaufort)	142.2	163.6	450.8	19.9	60.7
Total (Laurel Bay)	0.03	1.2	0.3	4.2	0.06

a Includes JP-5 storage, gasoline, fuel oil, and fuel dispensing losses.
b Includes emissions from two separate source points.
c Aircraft emissions existing in 1997; stationary source emissions existing in 1995.
d Aircraft engine VOC emissions reported under mobile sources and engine testing are nonmethane hydrocarbons.

Key:

CO = Carbon monoxide.
JP5 = Jet fuel.
NO_x = Oxides of nitrogen.
PM10 = Respirable particulates.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compound.

Source: Radian 1996.

At the Laurel Bay Family Housing Area, the topographic elevations range from MSL on the western edge along the Broad River to 40 feet above MSL on the eastern side of the area.

3.2.10.2 Geology

MCAS Beaufort lies atop a geological cross section of surficial sands to a depth of 30 to 40 feet (9.1 to 12.2 meters). The surficial sands overlay the Hawthorn Formation and the Ocala limestone formation (SOUTHDIV 1994). While this geologic structure is stable enough to support development, compaction or other means is often required to achieve load bearing capacities to support structures.

3.2.10.3 Soils

There are 22 individual soil types at MCAS Beaufort, which can be grouped into three general soil classifications. The Bohicket-Capers-Handsboro series covers approximately 40% of the station and generally contains very poorly drained soils with a high organic content, posing severe constraints to development. The Coosaw-Williman-Ridgeland series and the Wando-Seebrook-Seewee series cover the remaining 60% of the station. These soils are generally characterized as somewhat poorly drained with moderate limitations on development (SOUTHDIV 1994).

There are 11 soil types at the Laurel Bay Family Housing Area, which can be grouped into three general soil classifications. The Wando series covers approximately 51% of the site and is highly suitable for most urban uses. The Coosaw-Eddings-Nemours-Seabrook series covers approximately 21% of the site and is moderately suitable for most urban uses. The Bohicket-Capers-Deloss-Polawana-Ridgeland-Williman series covers approximately 29% of the site and is unsuitable for development, being found in low depressions and marsh areas (SOUTHDIV 1994).

Soil classifications and development constraints within the proposed project areas under ARS 2 and ARS 4 at MCAS Beaufort and the Laurel Bay Family Housing Area are presented in Table 3.2-9. Despite these moderate and severe constraints, facilities at MCAS Beaufort have been successfully constructed on these soils.

Table 3.2-9

SOIL CLASSIFICATIONS FOR PROPOSED GROUND DISTURBING PROJECTS AT MCAS BEAUFORT (ARS 2 AND ARS 4)

Proposed Project	Soils	Development Constraints[a]
ARS 2		
MF Pad	Williman loamy fine sand	Severe
ARS 4		
MF Pad	Williman loamy fine sand	Severe
CALA Pad	Seabrook fine sand	Moderate
Parallel Runway	Polawana loamy fine sand	Severe
Flight Simulator	Seabrook fine sand	Moderate
AIMD Facility	Coosaw loamy fine sand	Moderate
Child Development Center	Coosaw loamy fine sand	Moderate
BEQs	Coosaw loamy fine sand	Moderate
3-Module Hangar	Tomotley loamy fine sand	Severe
Parking Apron/Taxiway	Sandy udorthents	Moderate
Missile Magazines	Murad fine sand	Moderate
Family housing	Wando fine sand	Slight

a "Severe" constraints to development due to higher water tables, slow drainage, low absorption, up to 35% clay soils, not suitable for septic tanks. Soils in this series may be more difficult to compact or will require additional fill. "Moderate" constraints to development due to water table within 4 feet of the surface, very fine surface sands, rapid permeability, more difficult to compact. Ditching required to drain sites. Not suitable for basements.

Source: SOUTHDIV 1994.

3.2.11 Water Resources

3.2.11.1 Surface Water

The two major surface water discharge basins in the Beaufort region are the Broad River-Beaufort River-Port Royal Sound system and the Coosaw River-Morgan River-Combahee River-Edisto River-St. Helena Sound system (SOUTHDIV 1994). Major water bodies in the vicinity of the station include Brickyard Creek, Albergotti Creek, and Mulligan Creek, which flow into the Coosaw and Beaufort rivers.

SCDHEC classifies surface water bodies in order to protect the actual or projected uses of the water body. The classifications that apply to surface water bodies in the vicinity of the station include:

- SFH: Tidal saltwaters protected for shellfish harvesting. These waters are suitable for uses listed in Class SA and Class SB.

- SA: Tidal saltwater suitable for primary and secondary contact recreation. These waters are also suitable for uses listed in Class SB.

- SB: Tidal saltwater suitable for secondary contact recreation, crabbing, and fishing, except harvesting of crabs, mussels, or oysters for market purposes or human consumption (includes Brickyard and Albergotti creeks). These waters are also suitable for the survival and propagation of a balanced indigenous aquatic community of marine flora and fauna.

The installation also has two freshwater ponds, Scout Pond and Round Island Pond, which are commonly used for fishing. Both ponds are stocked with bass, bluegill, catfish, and grass carp. Fishing on the installation is permitted in accordance with federal and state fishing laws and installation regulations.

Drainage on MCAS Beaufort consists of sheet flow across areas of low topographic relief combined with the lack of a main stream or drainage field which results in slow runoff and low-level ponding. In addition, the fluctuating tides impede surface water drainage and cause backup or backwater. The soil conditions also lead to large amounts of water entering a stream channel with insufficient hydraulic carrying capacity for the flow. These conditions are common throughout the immediate coastal area of the region.

Under its existing NPDES permits, MCAS Beaufort is permitted to discharge a maximum of 0.75 MGD from the wastewater treatment plant at the main base and a maximum of 0.75 MGD from the wastewater treatment plant at the Laurel Bay Family Housing

Area. Stormwater discharges are also permitted from several discharge locations at the main base and the Laurel Bay Family Housing Area.

Considerable areas at the station are within the 100-year floodplain. Hazard areas at MCAS Beaufort include the salt marsh located along the eastern property line, which is inundated daily by a 8.6-foot (2.6-meter) tidal fluctuation. At the Laurel Bay Family Housing Area, the 100-year floodplain is primarily located along the western boundary adjacent to the Broad River (SOUTHDIV 1994); however, the majority of the housing is located outside of the 100-year floodplain contour interval.

3.2.11.2 Groundwater

The two aquifers present in Beaufort County include a shallow-unconfined aquifer (surficial aquifer) and a deep-confined aquifer (Floridan Aquifer). The surficial aquifer consists of approximately 40 to 60 feet (12 to 18 meters) of Pleistocene-age permeable sands above the limestone bedrock aquifer. Transmissivity of the surficial aquifer ranges from 10,000 gallons per day per square foot (gpd/ft^2) in the very permeable clean sands to much lower values in the finer soils composed of silts, clays, and very fine sands (SOUTHDIV 1994).

The Floridan aquifer system extends continuously from South Carolina into Florida. This aquifer is the most important source of groundwater in the area, supplying thousands of wells in the central coastal plain (SOUTHDIV 1994). The Floridan Aquifer may be encountered under confined conditions at depths between 100 and 250 feet (30.5 and 76 meters) in many locations near Beaufort. However, in the vicinity of the station, the aquifer may be encountered under partially confined and possibly unconfined conditions at depths of 40 to 60 feet (12 to 18 meters) because of the proximity of a recharge area along the station's western boundary.

3.2.11.3 Wetlands

Wetland areas that would be impacted by the proposed parallel runway and CALA Pad (ARS 4) were delineated in April and May of 1997 in accordance with the 1987 *USACE Wetlands Delineation Manual* (Environmental Laboratory 1987). Wetland areas that would be impacted by the 3-module hangar and associated parking apron and the proposed family housing at Laurel Bay Family Housing Area were identified from digital NWI maps. The wetland communities in potentially affected areas were characterized according to the NWI classification system developed by the USFWS (Cowardin et al. 1979). Field investigations

resulted in the identification of four wetland habitat types at the station: palustrine forested (PFO), palustrine emergent (PEM), palustrine scrub-shrub (PSS), and estuarine emergent (EEM).

The 1997 surveys and digital NWI maps identified wetlands totaling 150.56 acres (61 hectares) on base. Surveys were limited to those portions of the base where construction/clearing activities were proposed (see Figure 3.2-15). The wetlands have been grouped into PFO, PSS, PEM, (or complexes of these three types) and EEM cover types. The following is a description of the wetlands identified in each of the project areas. Table 3.2-10 identifies each wetland delineated, the wetland size, and the proposed construction project.

Parallel Runway

Nine wetlands were identified within, or adjacent to, the construction and clear zone areas of the proposed new runway. However, nonforested wetlands in the Type II and Type III clear zones would not be disturbed. Wetlands potentially impacted by the runway would include four PFO, one PFO/SS, one PSS, one PEM, one PEM/PSS, and one EEM wetlands. Descriptions of these wetland types are provided below.

Palustrine Forested. The dominant vegetation within this wetland type consists of red maple (*Acer rubrum*) and sweet gum (*Liquidambar styraciflua*) in the overstory with reproduction of these same species also dominating the understory. The herbaceous layer includes chainfern (*Woodwardia spp.*) and cinnamon fern (*Osmunda cinnamomea*). Poison ivy (*Toxicodendron radicans*) and virginia creeper (*Parthenocissus quinquefolia*) are dominant vines where lianas encroached on the edges of the wetland. Wetland No. 13 is not typical of the other PFOs in the project area. In this wetland, Chinese tallow-tree (*Sapium sebiferum*) dominates in all strata. In the herbaceous layer, smartweed (*Polygonum spp.*) is a co-dominant.

The soils associated with these forested wetlands include Bladen, Polawana, and Coosaw. Bladen and Polawana are on the hydric soils list. Coosaw soils are not on the hydric soils list but commonly contain minor inclusions of other soil series that are hydric. Additionally, Udorthents underlie Wetland No. 13. Udorthents are associated with areas that have been excavated, filled, or otherwise disturbed.

Palustrine Forested/Palustrine Scrub-Shrub. The single largest palustrine wetland delineated as part of this project is representative of this wetland type. Because of this

Table 3.2-10

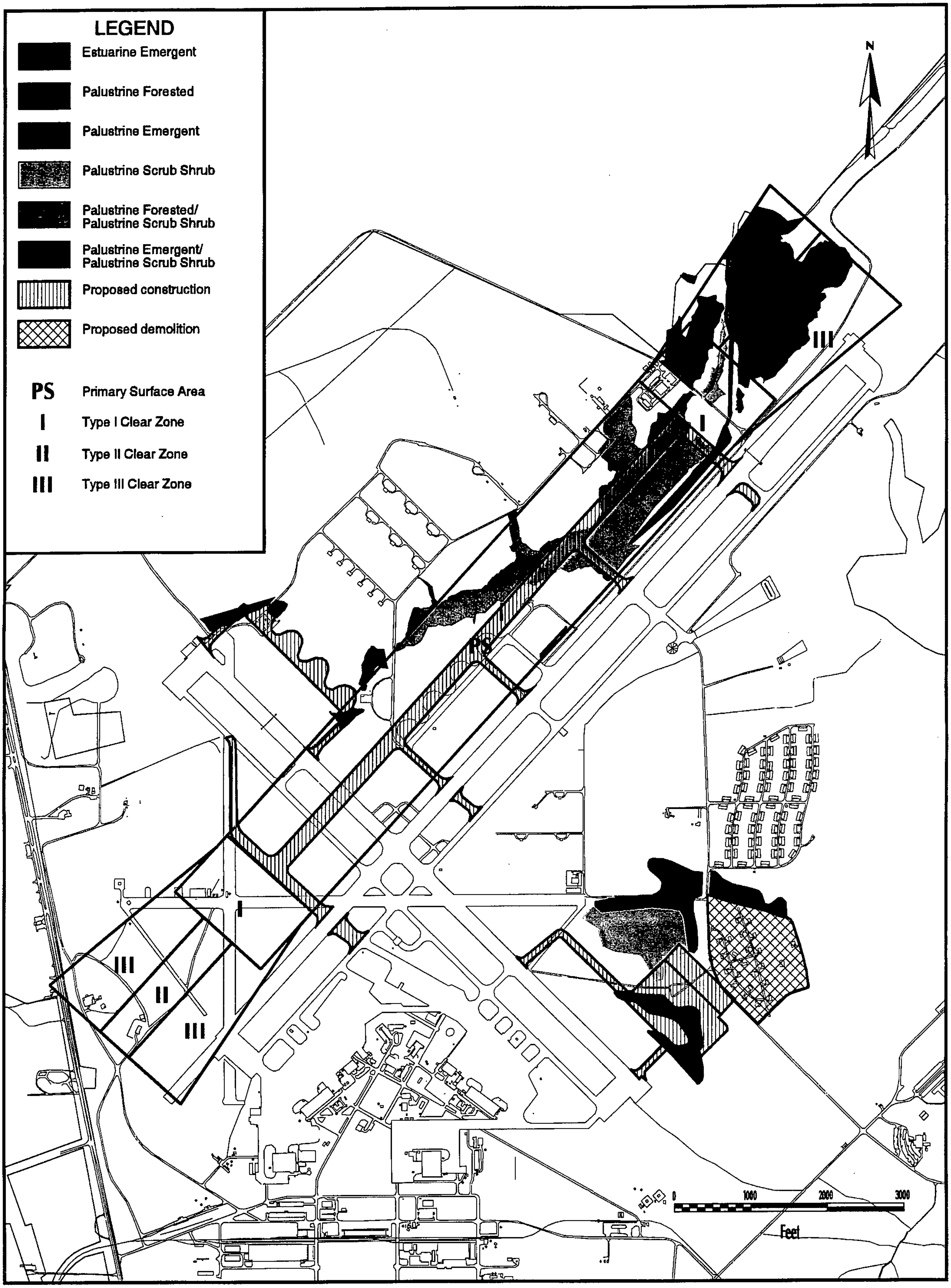
WETLANDS WITHIN PROPOSED PROJECT AREAS AT MCAS BEAUFORT

Wetland[e]	Cowardin Classification	Facility	Area[a] (acres)	Comment
1	PFO/PSS	New Runway[b]	64.57	Primary surface. Wetland borders are conservative. Upland inclusions occur.
2/12	EEM	New Runway[b]	58.05[b]	Type II and Type III clear zones. Wetland Nos. 2 and 12 have been combined. Tidally influenced salt marsh.
3	PEM	New Runway	0[d]	Outside construction footprint.
4	PFO	New Runway	11.25	Type I and Type III clear zones.
5	PSS	New Runway	3.06	Type I, II, and Type III clear zones.
6	PFO	New Runway	0.24[c]	Primary surface; connected via culvert to Wetland 9.
7	PFO	CALA Pad	1.08	Connected via culvert to Wetland 8.
8	PFO	CALA Pad	0.25	Connected via culvert to Wetland 7.
9	PFO	CALA Pad New Runway	0.65 0.55	Connected via culvert to Wetland 6.
10	PEM/PSS	New Runway	1.04	
13	PFO	New Runway	0.52	
14	PSS	New Hangar/ Parking Apron	0.96	
15	PFO	New Hangar/ Parking Apron	8.34	
16	PFO	Laurel Bay Family Housing	0.0[d]	
Total			150.56	

[a] Wetland acreage reflects only the totals within the facility footprint.
[b] New runway includes aboveground level areas and clear zones; however, nonforested wetlands in the clear zone will not be disturbed.
[c] Wetland located adjacent to CALA Pad.
[d] Wetland located adjacent to proposed construction area.
[e] Wetland 11, delineated during field surveys, falls outside of the footprint and would not be impacted by the proposed project.

Key:

EEM = Estuarine emergent.
PEM = Palustrine emergent.
PEM/PSS = Palustrine emergent/palustrine scrub-shrub.
PFO = Palustrine forested.
PFO/PSS = Palustrine forested/palustrine scrub-shrub.
PSS = Palustrine scrub-shrub.



Source: Donnelly 1997; USFWS n.d.

Figure 3.2-15
Wetlands Within Proposed Development Areas at MCAS Beaufort

wetland's size and complexity, the in-field delineations included several small upland inclusions within the surveyed boundaries of the wetland.

The vegetation consists of the same dominant vegetation as the PFO wetland with the addition of privet (*Ligustrum sinense*) and wax myrtle (*Myrica cerifera*) in the shrub layer and blackberry (*Rubus betulifolius*) in the vine layer, which is intermixed with the PFO species in some areas to form dense thickets. Except for the estimated age of the stands, the PSS portions of this wetland are not significantly different from the forested components. The soils associated with this wetland are mapped as the Bladen, Polawana, Seabrook, and Coosaw series. All but Coosaw are on the hydric soils list.

Palustrine Scrub-Shrub. This wetland consists of chinese privet, groundsel tree (*Baccharis halimifolia*), marsh elder (*Iva frutescens*), and chinese tallow-tree in the understory and smartweed (*Polygonum spp.*) and seaside goldenrod (*Solidago sempervirens*) in the herbaceous layer. The soils associated with this wetland are the Bladen and Coosaw series.

Palustrine Emergent. This wetland is dominated by switchgrass (*Panicum virgatum*) and soft rush (*Juncus effusus*). Scattered groundsel trees were also present. The underlying soils are mapped as the Tomotley series, a listed hydric soil.

Palustrine Emergent/Palustrine Scrub-Shrub. This wetland is dominated by black willow (*Salix nigra*) in the understory, soft rush in the herbaceous layer, and laurel-leaf greenbriar (*Smilax laurifolia*) in the vine layer. It is underlain by mapped Udorthents soils.

Estuarine Emergent. This wetland is a tidally influenced salt marsh dominated by saltmarsh cordgrass (*Spartina altiniflora*), needlegrass rush (*Juncus roemeranus*), dwarf glasswort (*Salicornia biglovii*), and seaside goldenrod. Marsh elder is present along the edges of the wetland. The soils underlying this wetland are mapped as Bohicket, a listed hydric soil.

CALA Pad

Three wetlands were identified in the proposed construction area for the new CALA Pad. Two of the wetlands historically were connected but are now divided by a paved road. All three are PFO wetlands, similar in nature to the wetlands discussed for the parallel runway. The soils underlying these wetlands are mapped as the Polawana series.

3-Module Hangar and Parking Apron

Two wetlands were identified within the proposed construction area for the 3-module hangar and the associated parking apron. One of the wetlands is a palustrine scrub-shrub wetland, and the other is a palustrine forested wetland. Although identified from NWI maps, it is likely that both have vegetative composition and other characteristics similar to those of the wetlands described for the parallel runway. Underlying soils at these wetlands are predominantly Tomotley loamy fine sand, which is listed as a hydric soil in Beaufort County.

Laurel Bay Family Housing Area

One palustrine forested wetland is located adjacent to the proposed construction area for family housing at the Laurel Bay Family Housing Area (see Figure 3.2-16). This wetland consists of a mixture of hardwood species such as sweetgum and water oak (*Quercus nigra*) in the overstory, interspersed with loblolly pine (*Pinus taega*). Understory and herbaceous species are similar to those described for other, similar forested wetlands at MCAS Beaufort. The wetland area is primarily underlain by two soils listed as hydric in Beaufort County: Deloss fine sandy loam and Williman loamy fine sand.

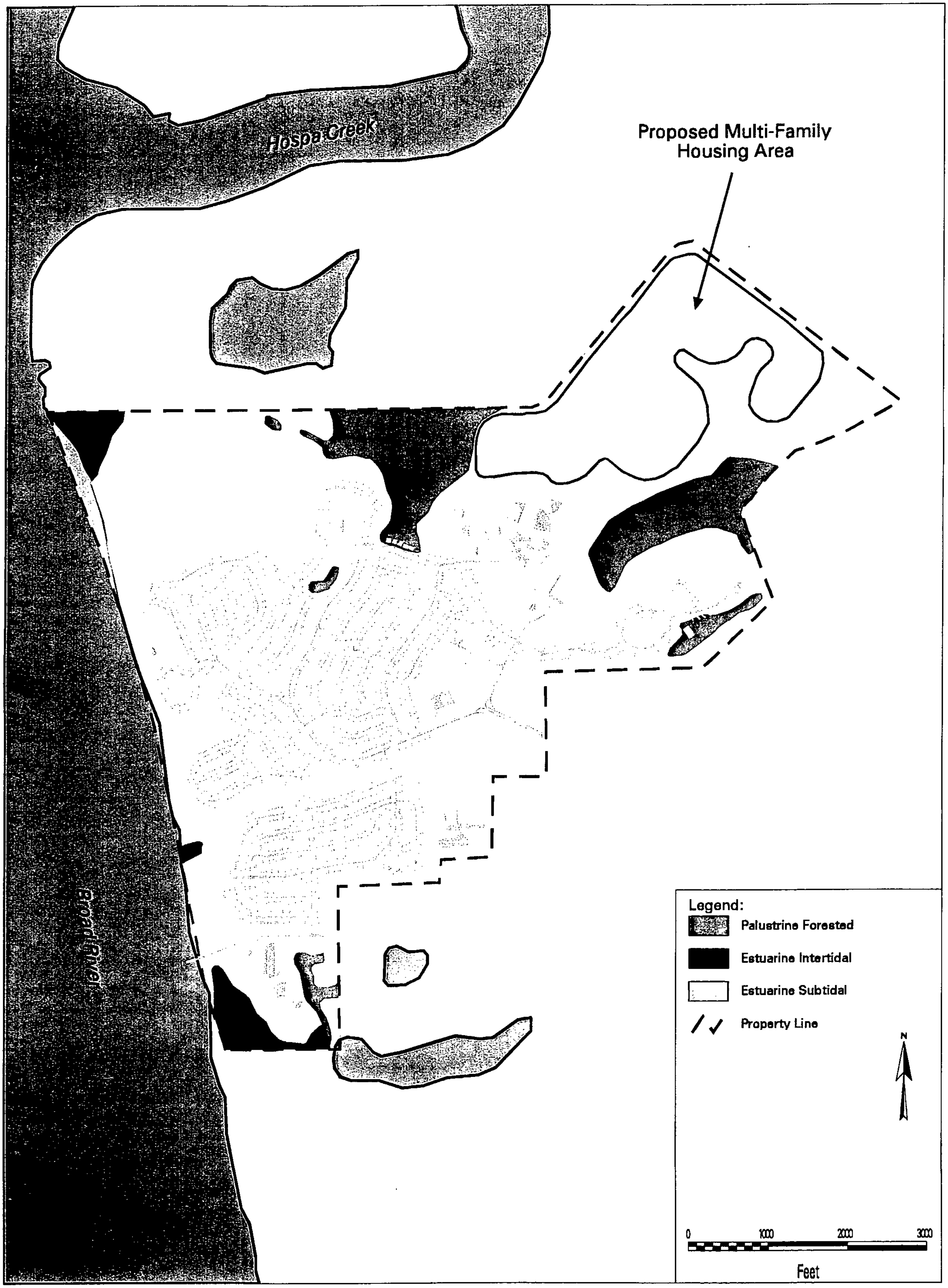
3.2.12 Terrestrial Environment

3.2.12.1 Vegetation

Vegetation of MCAS Beaufort can generally be characterized as a mixture of forested and brush areas, brackish wetland, and developed/maintained areas (see Figure 3.2-17) (SOUTHDIV 1994). The dominant cover type is planted pine forests, which accounts for approximately 62% of the total forested acreage (Spence 1996). Loblolly pine and slash pine are the major species present in forested areas, although these are interspersed with some longleaf pine (Spence 1996). Brackish marsh areas are found in the southern and eastern portions of the station along Albergotti and Brickyard creeks, characterized by such species as cordgrass (*Spartina* sp.) and black needlerush (*Juncus roemerianius*). Developed/maintained areas are found along the flight line and in the core area of the station.

Parallel Runway

The proposed parallel runway is located adjacent to the eastern edge of existing Runway 5/23, which is aligned southwest to northeast. Vegetation is characterized by a mixture of estuarine and freshwater wetlands, planted pine, forested and shrubby area, and developed/maintained areas. Wetland complexes comprise the dominant vegetation toward the



Source: SOUTHDIV 1994

Figure 3.2-16
Wetlands at Laurel Bay Family Housing Area
MCAS Beaufort

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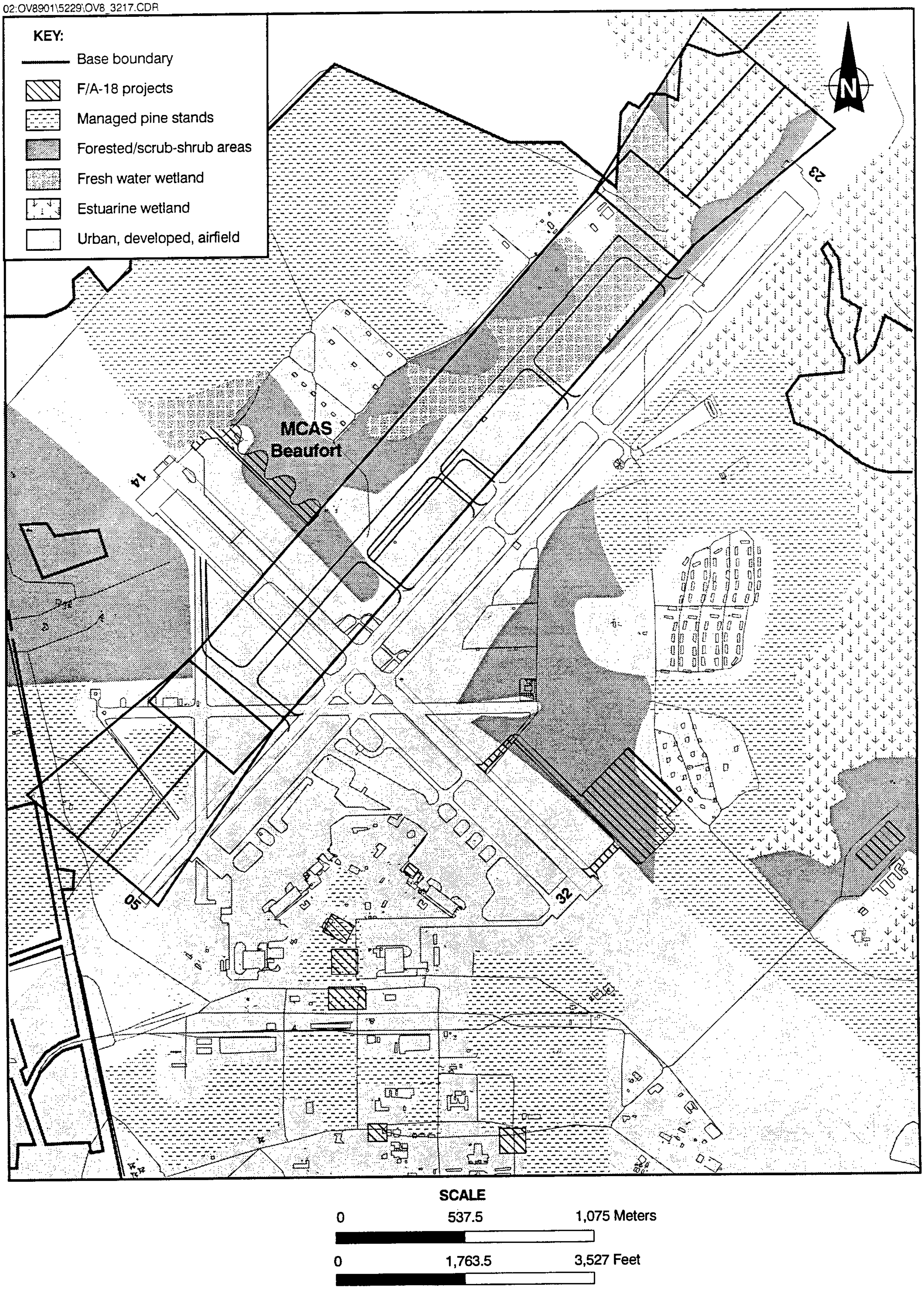


Figure 3.2-17 GENERAL PATTERNS OF VEGETATION PRESENT AT MCAS BEAUFORT IN AREAS OF PROPOSED CONSTRUCTION

northeastern end of the new runway. These are discussed in Section 3.2.11.3. Planted pine communities are primarily located toward the southwestern end of the runway, although a few smaller pockets were identified adjacent to the large wetland complexes. The base currently manages both loblolly pine (*Pinus taeda*) and slash pine (*Pinus elliottii*). Forested and shrub communities comprise most of the upland areas northeast of existing Runway 14/32 adjacent to the larger wetland complexes. Most of this area is not actively managed as part of the base's silviculture program. Typical forested species include sweetgum and oaks interspersed with pines. The shrubby areas typically include wax myrtle (*Myrica cerifera*), groundsel-tree (*Baccharis halimifolia*), and Chinese tallow (*Sapium sebiferum*), with extensive vine growth. The developed/maintained areas are located directly adjacent to the existing runways, the CALA Pad, and other existing facilities that fall within the proposed clear zone for the proposed runway.

CALA Pad

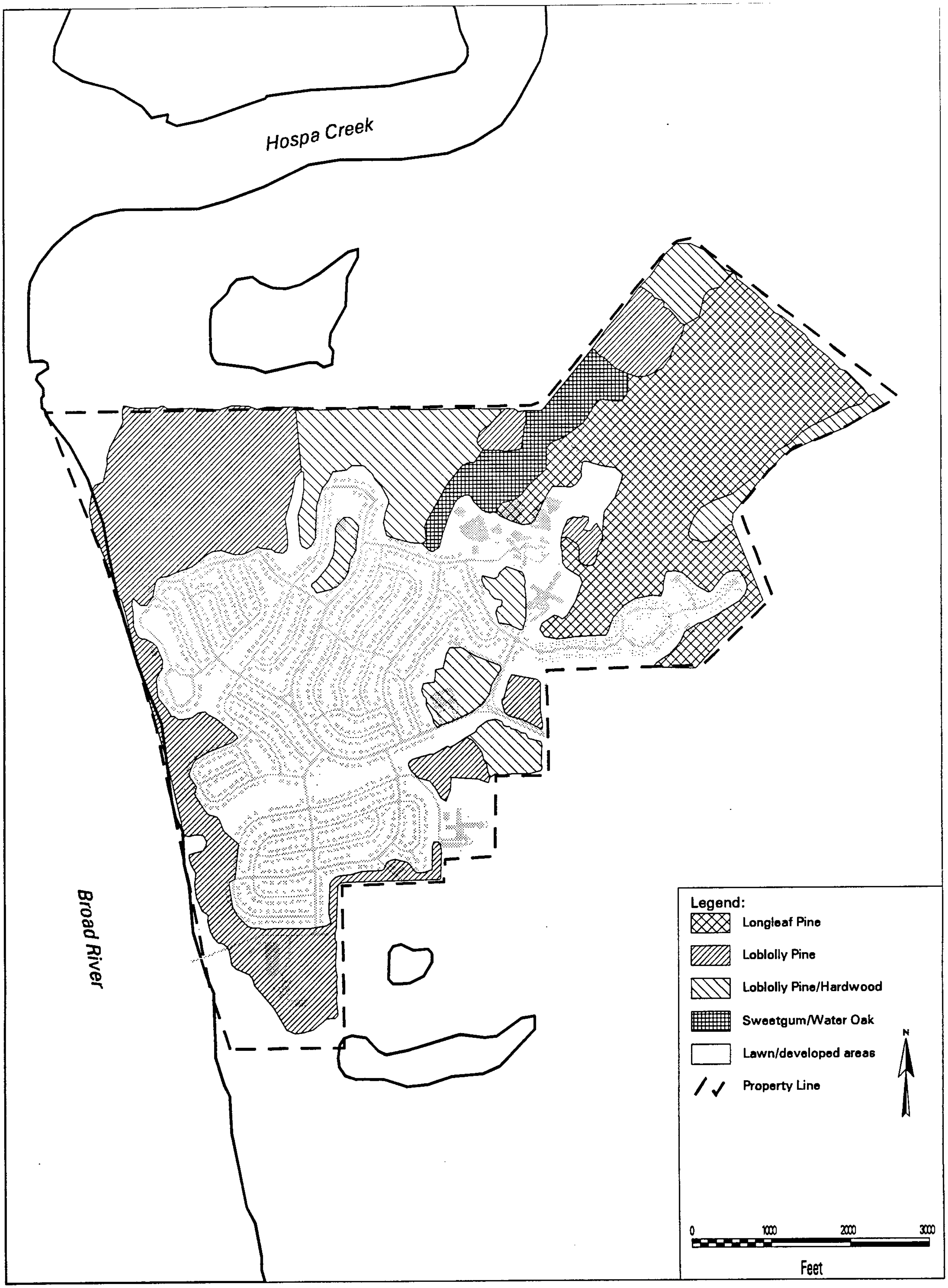
The site for the relocated CALA Pad is primarily mixed pine-hardwood forest with smaller areas of freshwater wetland and maintained/developed areas. Loblolly pine and slash pine stands are the dominant pine species, with some hardwood species including sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), and live oak (*Q. virginiana*). Wetlands are discussed in Section 3.2.11.3.

3-Module Hangar and Parking Apron

The proposed site for the new hangar and parking apron is primarily mixed pine-hardwood forested and shrub cover. A large portion of the parking apron is forested wetland. The remainder of the parking apron and the majority of the hangar itself are located in forested and shrubby upland. Small areas of the parking apron are located in maintained grass. Forested areas consist of loblolly pine and slash pine, with hardwood species, including sweetgum, live oak, and water oak (in wetter locations), interspersed with the pines. Shrubby areas typically contain smaller individuals of these species, but dominant shrub species include wax myrtle and Chinese tallow. Wetlands are discussed in Section 3.2.11.3.

Laurel Bay Family Housing Area

The proposed family housing at the Laurel Bay Family Housing Area is located within four primary vegetative communities: longleaf pine, loblolly pine, mixed loblolly pine/hardwood, and sweetgum/water oak (see Figure 3.2-18). The longleaf pine stands cover



Source: SOUTHDIV 1994

Figure 3.2-18
Vegetation at Laurel Bay Family Housing Area
MCAS Beaufort

the upland southeastern portions of the construction area, while the loblolly pine community is located in upland areas to the north. The mixed loblolly pine/hardwood community is present at transitional areas from upland to lowland, while sweetgum/water oak stands dominate lowland areas. The longleaf and loblolly pine communities are composed primarily of the dominant species, with only small inclusions of hardwoods and other pine species. Mixed pine/hardwood areas typically have more inclusions of hardwoods, including sweetgum and live oak.

Flight Simulator, MF Parking Pad, AIMD Facility, and Child Care Development Center

These facility sites are all currently pine stands maintained as part of the base's silviculture program. The stands are relatively mature, with caliper widths ranging between 18 and 20 inches dbh. These stands are periodically subjected to prescribed burning, resulting in relatively little understory. The groundstory is dominated by early successional species including brambles (*Rubus spp.*), sweet gum seedlings, sassafras (*Sassafras albidum*), and various grasses and herbaceous species.

BEQs

The BEQs will be constructed entirely within existing developed areas containing a parking lot and a football field. Vegetation is limited to maintained lawn and landscaped ornamentals.

3.2.12.2 Wildlife

Wildlife potentially supported at MCAS Beaufort depends on the various habitat types at the station. Planted pine stands, such as slash-loblolly and longleaf pine forest, provide valuable habitat for many birds and mammals. Mammals in these areas could include gray and fox squirrels, red fox, eastern cottontail rabbit, and white-tail deer (Merritt 1992a; Burt and Grossenheider 1976). Bird species in such areas could include sparrows, warblers, and raptors (Robbins et al. 1983). Northern bobwhite, quail and doves can also benefit from the slash-loblolly or longleaf pine forest with regular prescribed burning, open stands, and the occurrence of a large variety of native legumes.

Forested and emergent wetlands generally provide excellent habitat for a variety of amphibians, reptiles, and birds, but few mammal species are associated exclusively with wetlands. Pronounced wet-dry cycles provide favorable year-round habitat for amphibians and reptiles, including the Eastern cottonmouth (*Agkistrodon piscivorus*), five-lined skink

(*Eumeces egregius similus*), snapping turtle (*Chelydra serpentina*) and numerous species of frogs (Conant and Collins 1991). Insects, crayfish, and snails are also plentiful in wetland habitats and provide an abundant, high-quality food source for vertebrate wildlife. Invertebrates unique to the estuarine wetlands are fiddler crabs (*Uca* sp.), blue crabs (*Callinectes sapidus*), the American oyster (*Cassostrea virginica*), and hard clam (*Hercenario mercenaria*). Common mammalian species which rely on wetland areas for food and water include the white-tailed deer, racoon, and opossum. In addition, several avian species including herons, egrets, bitterns, rails, ducks, waterfowl, and wading birds commonly use wetland areas for food, water, and/or nesting sites (Conant and Collins 1991).

Disturbed/developed areas are used by wildlife species tolerant of high levels of human disturbance. These include such species as the house sparrow (*Passer domesticus*), european starling, black rat (*Rattus rattus*), and house mouse (*Mus musculus*). Many native species are found in these habitats as well, such as the mourning dove, Carolina wren, northern mockingbird, northern cardinal, blue jay, chimney swift (*Chaetura pelagica*), and gray squirrel.

3.2.12.3 Threatened and Endangered Species

An inventory of rare, threatened, and endangered plant and animal species was conducted at MCAS Beaufort during 1990, 1991, and 1992. Four plant and one animal species of concern were identified as confirmed residents on MCAS Beaufort. Subsequent to this inventory, a second animal species of concern was identified on the base.

Two plant species identified in wetland communities in the northern and western portions of the station include pondberry (*Lindera milissifolia*) and pondspice (*Litsea aestivalis*). Pondberry is a federal- and state-listed endangered species. Pondspice is a state-listed and a federal candidate species (SOUTHDIV 1994). In addition, two other plant species of concern (*Listera australis* and *Muhlenbergia filipes*) tracked by the S.C. Heritage Trust Program were located on the station. These species have no legal standing and are unlikely to be listed by the state or the federal government.

The American alligator (*Alligator mississippiensis*) is a confirmed resident of the station, and is known to occur in the wetland communities on MCAS Beaufort. This reptile is considered threatened under both the federal and state listing status of the proposed project area. The alligator is likely to occur only at the parallel runway site within the tributary to Brickyard Creek and associated salt marsh at the northeastern extent of the parallel runway.

The least tern (*Sterna antillerum*) is also a confirmed resident of the station, with rooftop colonies being established on base during 1995. This bird is a state-listed threatened species. Typically, this species utilizes beach areas above the reach of ordinary high tide. However, due to development pressures on their natural habitats, the terns have resorted to using rooftops with white crushed rock or pea gravel substrates.

The 252 acres of mature longleaf pine forest located at the Laurel Bay Family Housing Area represent a unique habitat at MCAS Beaufort. Trees in this area are suitable in age and size to provide habitat for the federally endangered red-cockaded woodpecker (*picoides borealis*). However, no sign of woodpecker activity has been noted at the site, and no known nesting trees for red-cockaded woodpecker are located in Beaufort County.

3.2.13 Cultural Resources

3.2.13.1 Archaeological Resources

The majority of the surface area comprising project areas at MCAS Beaufort under the various ARSs has been disturbed or assessed under previous cultural resources investigations (Panamerican Consultants, Inc. [PCI] 1995; PCI 1997; New South Associates [NSA] 1994). Additional reconnaissance of these project areas was conducted in 1997. Information derived from the previous investigations and reconnaissance serves as a basis for determining the archaeological sensitivity of the project areas and the effects of the proposed projects on cultural resources. The following sections describe known archaeological sites and other resources (i.e., cemeteries) located within proposed construction areas and documents their current status.

CALA Pad/Parallel Runway

Approximately 80% of the combined area of these projects has been the subject of previous surveys. Twelve archaeological sites exist within the footprint of these project areas.

The distribution of these sites are as follows. Eight known archaeological sites are situated within the western portion of the proposed runway's 1,500-foot-wide primary surface (38BU1342; 38BU1358; 38BU1501; 38BU1502; 38BU1357; 38BBU1338; 38BU1356; and 38BU1337). Two known sites are situated within the Type III clear zone at the south end of the proposed runway (38BU1534 and 38BU1535). Additionally, two sites, 38BU1539 and 38BU1340, are situated within the westernmost transition zone. All known sites have been evaluated for their significance (i.e., their eligibility for listing on the National Register of Historic Places [NRHP]). Of the 12 sites known to exist within the proposed runway and

associated clearance zones, four sites are potentially eligible for listing on NRHP. These sites are described below.

Site No. 38BU1342. This site is located in the western portion of the proposed primary surface of the parallel runway. It is a multiple-component site, which includes historic remains attributable to 19th-century habitation, as well as prehistoric archaeological materials (NSA 1994).

Site No. 38BU1340. This site is located on the western boundary of the aforementioned portion of the transitional zone of the parallel runway. It produced historic and prehistoric archaeological materials. The prehistoric component of these materials is relatively high (NSA 1994).

Site No. 38BU1357. This site, identified by NSA in 1994, is located in the central portion of the primary surface of the parallel runway. It is a prehistoric site and yielded archaeological materials dating to both the Early Woodland and Mississippian periods (NSA 1994). Although the site was described in a previous investigation as being located "60 meters north of the northeasternmost arming pad [i.e, existing CALA Pad]," the site map indicates it is located 395 feet (120 meters) northeast of the northeasternmost arming pad (NSA 1994). Therefore, the precise location of this site is uncertain (see Site No. 38BU1501).

Site No. 38BU1501. This site is located near Site No. 38BU1357 and was discovered by PCI in 1995. It produced artifacts from the Middle Woodland, Late Woodland, and Mississippian periods. The PCI report indicated that the site is "located north of the arming pads and is centered around Building 1080" (PCI 1995). This location is extremely close to the approximate position of Site No. 38BU1357. At present, it is not clear whether Site Nos. 38BU1501, 38BU1357, and 38BU1502 (i.e., one of the aforementioned sites that were determined to be not NRHP-eligible) constitute three distinct sites or a single archaeological entity.

Other resources located within this combined project area include two cemeteries that were identified during the 1997 reconnaissance activities. These cemeteries are described below.

Givens Cemetery. This cemetery is located within the southeast portion of the northeast clear zone of the proposed parallel runway. It lies approximately 130 feet (40 meters) north of the station's perimeter road, approximately 260 feet (80 meters) east of a dirt road leading to Gate No.7, and west of a broad drainage ditch for Runway 23. The cemetery is defined by a 39-by-39-feet (12-by-12-meters) tabby wall (i.e., short, wide rubble wall). The preserved portions of the wall are approximately 32 inches (81 centimeters) high and 12 to 13 inches (30 to 33 centimeters) wide. The cemetery is overgrown with large trees, and its ground surface shows localized upheavals and disturbances.

The cemetery contains two internments, both situated in its southeast quadrant. One is a rectangular brick tomb with four domed-indented portals, topped with a marble slab. The inscription on the slab indicates that the tomb contains the internment of Thomas S. Givens, who died in 1820 at the age of four years and two months. It was erected by his mother, J.D. Givens. The second tomb is structurally similar but somewhat larger than the first and has a sandstone slab. The slab has been vandalized, and the inscription is unreadable.

Examination of the 1820 South Carolina census indicated that only one Givens family living in Beaufort County in 1820 had a male child under the age of 10 years. This household was headed by a Mrs. Stephen Givens (AIS, Inc. n.d.). The records of Beaufort County epitaphs, compiled prior to vandalization of the larger tomb, indicate that it contains the remains of one Stephen L. Givens, who died in 1817 at the age of 22. Observations made in 1949 indicate that there may be other unmarked graves in the cemetery, possibly containing the remains of other children of Mrs. Givens (Gregorie 1949).

Howard Cemetery. This cemetery is located on the northernmost boundary of the northeast clear zone for the proposed parallel runway. Howard Cemetery is a rectangular plot of land (approximately 40-by-40 meters) delineated on the south by a chain-link fence and on the west and east by a barbed-wire fence. The northern boundary is formed by the tidal marsh. The cemetery contains a single small, gray granite headstone located in its center that is inscribed with "Mother/Matilda G. Howard/1888-1952/Grandmother Sarah Giles." The surface area of the cemetery displays a number of regularly shaped, almost rectangular, depressions. These depressions may represent inexpertly heaped-up graves where the internment has decomposed. Conversely, they could possibly represent exhumation of internments and subsequent grave-pit filling. This practice occurred at another cemetery at MCAS Beaufort that needed to be relocated for new runway construction. However, the MCAS Beaufort Public Works Department has no such records for the Howard Cemetery (Jackson 1997).

In all probability, the lack of headstones and the collapse of grave pits can be explained by cultural factors (i.e., socioeconomic levels of the groups that used the Howard Cemetery). Additional research would be necessary to determine how many individuals were buried at the cemetery and their identities.

The potential archaeological sensitivity of the terrain that has not been previously surveyed varies across different locations within the CALA Pad/Parallel Runway project area. The potential for intact sites near the existing Runway 5/23 complex is low. An analysis of the design/construction of this complex indicates that extensive surface alteration occurred as a result of clearing, filling, and grading (U.S. Navy 1954; U.S. Navy 1986). These land moving operations likely resulted in the destruction of any archaeological sites. In fact, no sites were discovered by previous surveys near the existing runway. Similarly, extensive alteration took place in the northern clear zone and in its vicinity. The tidal marsh associated with Mulligan Creek has been dredged, and the spoil has been deposited north of the creek's course. In addition, 2.5 million cubic yards (2.1 million cubic meters) of sandy sediment was borrowed east of the runway and deposited under and around it to create a stable landing surface (U.S. Navy 1958; U.S. Navy 1964).

However, other locations within this project area have not been affected by prior documented surficial disturbances. Currently, archaeological resources associated with the proposed primary surface and transitional zone of the parallel runway could exist in the northern portion of the project area and portions of the proposed CALA Pad area.

MF Pad/Flight Simulator/AIMD Facility

The areas of the proposed construction were surveyed in 1994 and 1995 (NSA 1994, PCI 1995). A prehistoric site found at this location (38BU1361) has been determined to be ineligible for listing on the NRHP (NSA 1994).

3-Module Hangar and Parking Apron

A 3-module hangar, a parking apron, and a 2,457-feet long taxiway are proposed for construction east of the proposed runway. This area was surveyed in 1994 and 1995. One small historic site, 38BU1364, will be impacted by the proposed parking apron construction. This site has been determined ineligible for the NRHP (NSA 1994).

Child Development Center

The child development center is situated in a highly developed portion of the facility, south of Geiger Boulevard. This area was surveyed in 1994 (NSA). Although a number of archaeological sites are known to exist in the vicinity of the project, the proposed child development center will not impact any currently known cultural resource.

BEQ (P-411) and BEQ (P-412)

The areas for BEQ P-411 and P-412 projects correspond to the area of Site 38BU927 (the track site), a large multiple component prehistoric site. A number of archaeological investigations have been conducted over various portions of the site (Mistovich and Clinton 1991; PCI 1995; PCI 1997a; Metz 1997). In spite of extensive archaeological investigations, the western boundary of Site 38BU927 is not firmly established.

Localized areas of the site have undergone significant prior disturbance. Nevertheless, this site can make a significant contribution to the understanding of the South Carolina prehistory. This site has been determined to be eligible for listing on the NRHP.

The proposed footprints for the BEQ P-411 and BEQ P-412 projects are within the site boundary. Currently, these two locations are occupied by a parking lot and a football field. Whereas the construction of these existing facilities probably affected the surface of the site in the past, archaeological deposits and features may still be intact within the footprint of the proposed projects.

Missile Magazine

A missile magazine (1,010 square meters) will be built in the extreme northern portion of the Ordnance Storage Facility. This area underwent an archaeological survey in 1995 (PCI 1995). Although archaeological sites were identified in the vicinity of the proposed magazine, no sites are found within its footprint.

Laurel Bay Family Housing Area

The area of the proposed multi-family housing development was surveyed in 1995, 1996, and 1997 and was found to contain five archaeological sites. Four of these sites, 38BU1551, 38BU1693, 38BU1694 and 38BU1695, were ineligible for listing on the NRHP. A prehistoric site, 38BU1692, found in the extreme northeastern corner of the Laurel Bay Family Housing Area was found to be potentially eligible for inclusion on the NRHP (NSA

1994; PCI 1995; PCI 1997). This site lies within the overall boundaries of the proposed housing development.

A currently undetermined number of housing units may be constructed within the existing housing development (i.e., "infill") at Laurel Bay. Four archaeological sites are known to exist in this area. Sites 38BU1697 and 38BU1699 have been determined to be ineligible for listing on the NRHP (PCI 1997). A multiple component prehistoric and historic site, 38BU1698, is potentially eligible for NRHP listing (PCI 1997). Finally, a very large historic site has been identified in the extreme northwestern portion of the housing development (PCI 1995a). The Tabby Ruin Site, 38BU1431, was listed on the NRHP as Laurel Bay Plantation in February 1997 (Edmonds 1997).

3.2.13.2 Architectural Resources

All structures or facilities proposed for either renovation or demolition were constructed post-World War II. It has not yet been determined whether any of these Cold War (1946 to 1991) era structures or facilities at MCAS Beaufort would be eligible for listing on the NRHP (USC 1995). MCAS Beaufort is currently updating its Historic Preservation Plan, which will fully evaluate the station's resources as they do or do not relate to the Cold War. The result of this update will be coordinated with the South Carolina SHPO.

3.2.14 Environmental Contamination

3.2.14.1 Hazardous Materials and Waste Management

Aircraft maintenance is the largest source of hazardous waste generation at MCAS Beaufort. The types of hazardous waste associated with these activities include used hydraulic fluids, JP-5 fuel contaminated with solvents, mixed waste oils, waste paints, paint strippers, degreasing solvents, and batteries. In calendar year 1994, the station generated, disposed, and recycled 103,794 pounds (47,080 kilograms) of hazardous waste. The station has a RCRA Part B Permit, ID No. SC1750216169, for the hazardous waste storage facility. In addition, the station operates 32 hazardous material generator-unit accumulation sites.

3.2.14.2 Installation Restoration Program Sites

According to the RCRA hazardous waste permit application (Rust Environment & Infrastructure 1996), there are 20 ongoing Installation Restoration Program (IRP) sites at the station. IRP sites are shown on Figure 3.2-19. RFIs are scheduled for 13 sites, and confirmatory sampling will be conducted at seven sites. No further action is required at 24 SWMUs,

and these sites are not shown on Figure 3.2-19. None of the IRP sites are located in the proposed project areas.

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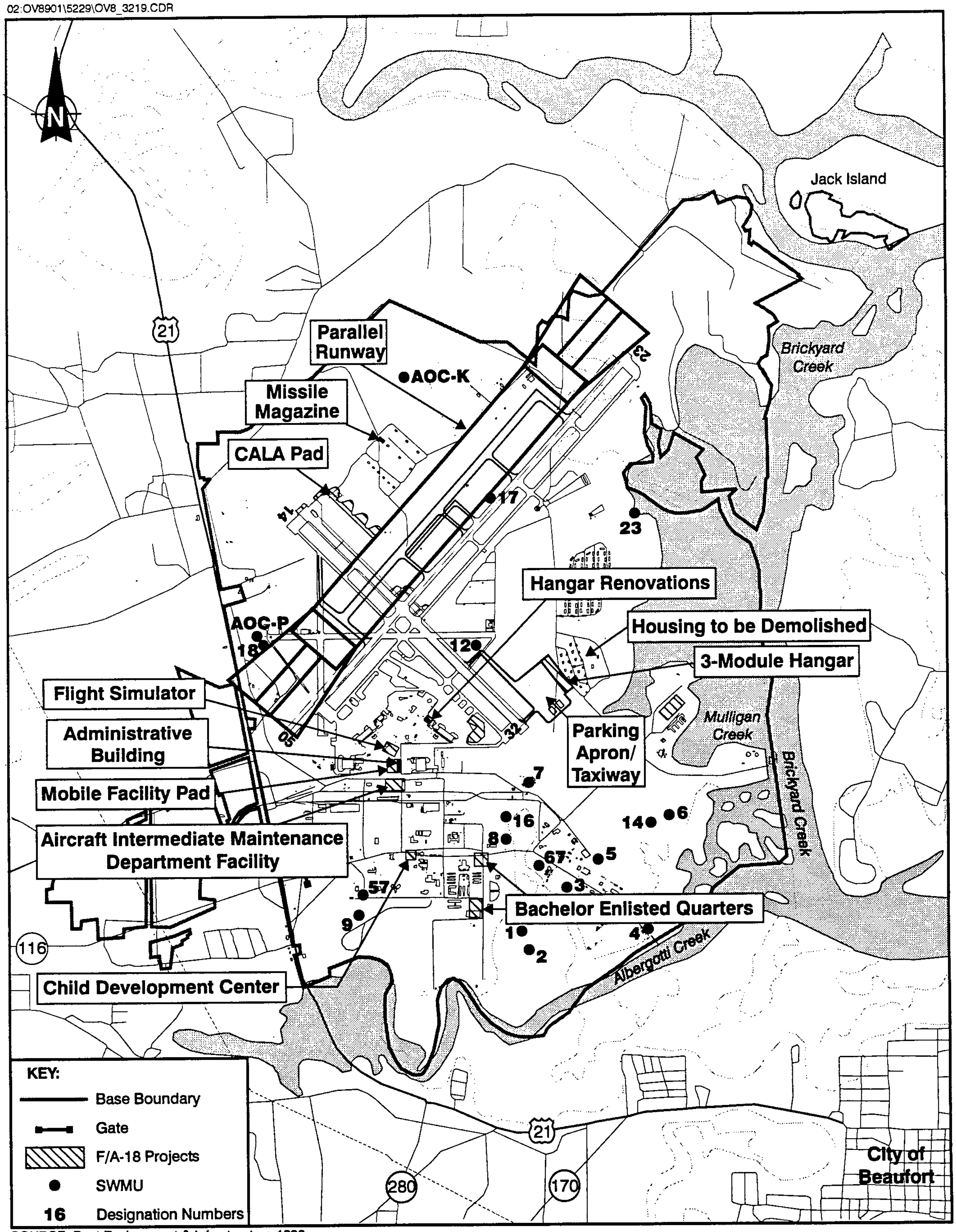

SOURCE: Rust Environment & Infrastructure 1996.

SCALE
0 1,075 2,150 Meters
0 3,527 7,054 Feet

Figure 3.2-19 INSTALLATION RESTORATION PROGRAM SITE LOCATIONS

3.3 Affected Environment at MCAS Cherry Point

3.3.1 Airfield Operations

MCAS Cherry Point utilizes two pairs of offset runways for arrival and departure traffic, and several pads for AV-8 and helicopter air operations (see Figure 3.3-1). The main landing area consists of four runways, which are offset to form a common centermat area. Takeoffs are made from the center of the airfield, and landings are made toward the center of the airfield. The offset Runways 32L and 32R are the primary calm-wind runways; Runway 32L (8,400 feet long by 200 feet wide) (2,580 by 61 meters) serves as the recovery runway, and Runway 32R (8,980 feet long by 200 feet wide) (2,737 by 61 meters) serves as the departure runway. Precision Approach Radar (PAR) services are available to all arrival Runways (32L, 23R, 14L, 05R), and Carrier-Controlled Approach (CCA) services are available to Runways 32L, 23R, and 14L.

Nominal airport area traffic patterns associated with Runway 32 (e.g., VFR patterns, GCA Box patterns, etc.) are shown on Figure 3.3-2. Table 3.3-1 presents 1997 airfield operations (e.g., landings, takeoffs, FCLP operations, etc.) at MCAS Cherry Point.

The station's primary OLF is MCALF Bogue, located 20 miles (32 kilometers) southwest of MCAS Cherry Point along Bogue Sound. This facility has a single 4,010-foot (1,222-meter) runway. It is designed to simulate a temporary runway that would be constructed in a forward position occupied by Marine Corps forces.

3.3.2 Military Training Areas

Aircraft that may be realigned to MCAS Cherry Point would use the same MTRs, Warning Areas, MOAs, and restricted areas as aircraft that may be realigned to NAS Oceana. Descriptions of these airspace components are provided in Section 3.1.2.

3.3.3 Target Ranges

Aircraft that may be realigned to MCAS Cherry Point would use the same target ranges as aircraft that may be realigned to NAS Oceana, specifically BT-9, BT-11, and Dare County ranges. Descriptions of these ranges are provided in Section 3.1.3.

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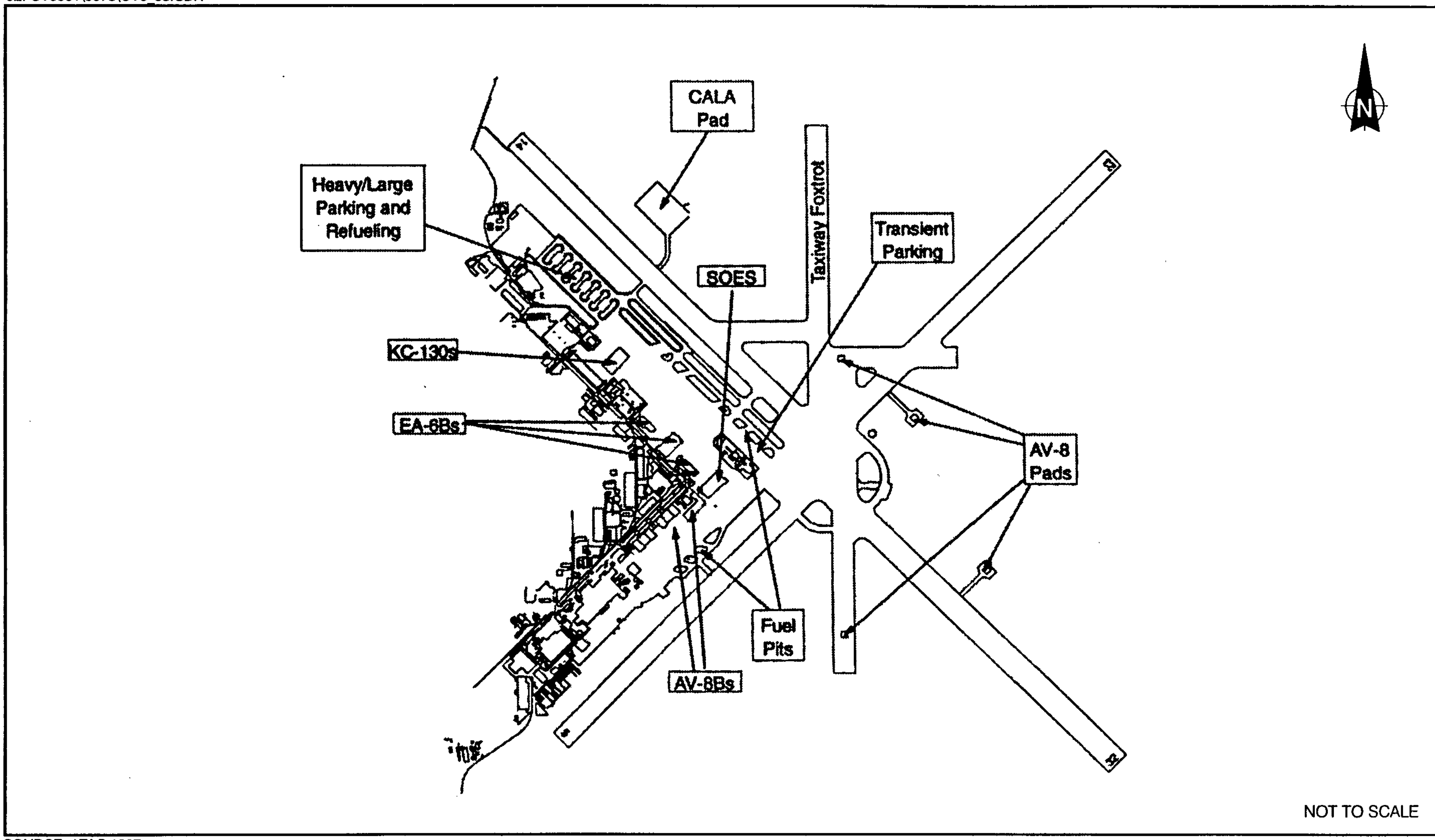

SOURCE: ATAC 1997

Figure 3.3-1 AIRFIELD LAYOUT - MCAS CHERRY POINT

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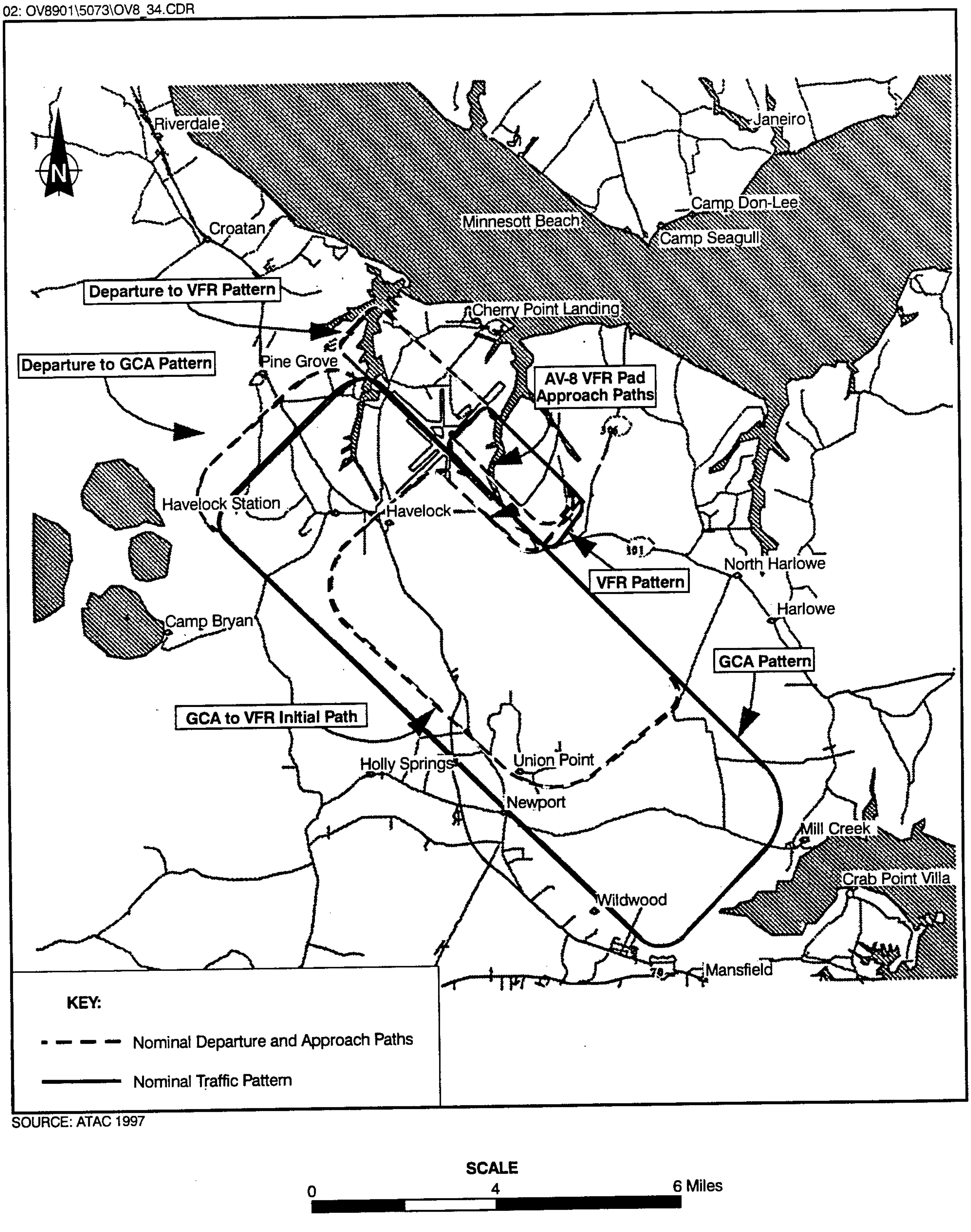

SOURCE: ATAC 1997

Figure 3.3-2 MCAS CHERRY POINT NOMINAL TRAFFIC PATTERNS

Table 3.3-1

1997 BASIC OPERATIONS AT MCAS CHERRY POINT

Aircraft Category	Operation Type	Airfield Operations Day 0700-2200	Night 2200-0700	Total
AV-8 Fleet	Departure	9,996	127	10,123
	Full Stop Visual Landing	8,062	307	8,369
	Full Stop Instrument Landing	529	29	558
	Pad Landing	1,129	80	1,209
	Visual Touch-and-Go/Low Approach	4,238	374	4,612
	Instrument Touch-and-Go/Low Approach	2,346	24	2,370
	Press-up	6,666	20	6,686
	Pad Vertical Takeoff to Pad Landing Circuit	2,804	182	2,986
	TOTAL	35,770	1,143	36,913
AV-8 FRS	Departure	11,404	166	11,570
	Full Stop Visual Landing	8,191	174	8,365
	Full Stop Instrument Landing	491	0	491
	Pad Landing	2,651	63	2,714
	Visual Touch-and-Go/Low Approach	772	6	778
	Instrument Touch-and-Go/Low Approach	4,062	66	4,128
	Press-up	6,476	70	6,546
	Pad Vertical Takeoff to Pad Landing Circuit	2,518	122	2,640
	TOTAL	36,565	667	37,232
EA-6B	Departure	2,119	7	2,126
	Full Stop Visual Landing	1,753	136	1,889
	Full Stop Instrument Landing	220	18	238
	Visual Touch-and-Go/Low Approach	5,188	314	5,502
	Instrument Touch-and-Go/Low Approach	1,720	250	1,970
	TOTAL	11,000	725	11,725
KC-130 Fleet	Departure	632	0	632
	Full Stop Visual Landing	251	31	282
	Full Stop Instrument Landing	328	22	350
	Visual Touch-and-Go/Low Approach	1,358	126	1,484

Key at end of table.

Table 3.3-1

1997 BASIC OPERATIONS AT MCAS CHERRY POINT

Aircraft Category	Operation Type	Airfield Operations		
		Day 0700-2200	Night 2200-0700	Total
	Instrument Touch-and-Go/Low Approach	1,582	24	1,606
	TOTAL	4,151	203	4,354
KC-130 FRS	Departure	803	0	803
	Full Stop Visual Landing	275	9	284
	Full Stop Instrument Landing	482	37	519
	Visual Touch-and-Go/Low Approach	3,771	170	3,941
	Instrument Touch-and-Go/Low Approach	3,296	60	3,356
	TOTAL	8,627	276	8,903
Transient Jet	Departure	1,750	48	1,798
	Full Stop Visual Landing	1,328	0	1,328
	Full Stop Instrument Landing	470	0	470
	Visual Touch-and-Go/Low Approach	1,336	0	1,336
	Instrument Touch-and-Go/Low Approach	1,050	2	1,052
	TOTAL	5,934	50	5,984
Transient Prop	Departure	658	0	658
	Full Stop Visual Landing	219	0	219
	Full Stop Instrument Landing	439	0	439
	Visual Touch-and-Go/Low Approach	2,628	0	2,628
	Instrument Touch-and-Go/Low Approach	360	2	362
	TOTAL	4,304	2	4,306
Transient Heavy	Departure	116	67	183
	Full Stop Instrument Landing	181	2	183
	Instrument Touch-and-Go/Low Approach	340	0	340
	TOTAL	637	69	706
Transient Large	Departure	535	159	694
	Full Stop Instrument Landing	146	0	146
	Instrument Touch-and-Go/Low Approach	541	7	548
	Instrument Touch-and-Go/Low Approach	938	6	944
	TOTAL	2,160	172	2,332

Key at end of table.

Table 3.3-1

1997 BASIC OPERATIONS AT MCAS CHERRY POINT

Aircraft Category	Operation Type	Airfield Operations		
		Day 0700-2200	Night 2200-0700	Total
Transient Helicopter	Departure	1,360	405	1,765
	Full Stop Visual Landing	1,732	33	1,765
	Instrument Touch-and-Go/Low Approach	268	0	268
	TOTAL	**3,360**	**438**	**3,798**
AIRFIELD TOTAL		**112,508**	**3,745**	**116,253**

Key:

MCAS = Marine Corps Air Station.

Source: ATAC 1997.

3.3.4 MCAS Cherry Point Land Use

3.3.4.1 Existing Land Use

Land use at MCAS Cherry Point is influenced by airfield facilities and environmental constraints associated with creeks, wetlands, and floodplains. Aircraft operational areas include four runways in a cross configuration, clear zones, and APZs. Other land uses at the station include support and training facilities, administrative uses, maintenance and supply, housing and community facilities, forestry, and open space/conservation.

The core area, the most developed portion of the station, is located east of Roosevelt Boulevard between Runways 5 and 14 (see Figure 3.3-3). Industrial uses, such as aircraft hangars, maintenance, supply, and storage, parallel Runways 5 and 14. The central and western areas of the core are less intensely developed, including such uses as BEQs and training facilities, recreation/entertainment activities, and administrative functions.

West of Roosevelt Boulevard, land uses include family housing, personnel support facilities, and recreation activities. The remainder of the station is largely undeveloped and primarily classified as open/conservation areas. Within this area, however, there are a number of isolated land use activities such as training, operations, and recreation.

Regional land uses around the station are influenced by large areas of land within the coastal plain that are ecologically unsuited for development. Development constraints include extensive areas of wetlands, federal and state land, water bodies, high erosion areas, and floodplains, and soil limitations such as wetness, rapid permeability, slow permeability or low strength. Craven County consists of approximately 502,300 acres (203,281 hectares) that is primarily undeveloped. The primary land covers are forest (55.5%), farms (14.4%), parks, (12.7%), water, (8.4%), developed areas (7.4%), and rights-of-way, (1.5%) (Holland Consulting Planners, Inc. 1995).

Land uses adjacent to MCAS Cherry Point are depicted in Figure 3.3-4. The Croatan National Forest comprises all of the area east of the station, whereas the north area of the station is bounded by the Neuse River and its tributaries. A limited amount of urban development primarily associated with the City of Havelock, occurs south and west of the station. Commercial land uses are concentrated west of the station along U.S. 70; the bulk of the commercial development occurs between NC 101 (the southern boundary of MCAS Cherry Point) and Slocum Road off U.S. 70. South of NC 101 is the core area of the City of Havelock. Excluding the station, which is 63.9% of the city's incorporated acreage, the predominant land use within the city is residential, which accounts for approximately 25% of the city's total acreage. Commercial and service activities occupy 2.2% of the city's acreage, and industrial activities occupy 0.1% of the city's acreage. The balance of the acreage is

devoted to government/institutional, vacant, cultural/recreation, and infrastructure activities (Holland Consulting Planners, Inc. 1996).

3.3.4.2 Plans and Policies

Development at MCAS Cherry Point and MCALF Bogue is guided or influenced by the following plans and policies:

- Master Plan, MCAS Cherry Point;
- MCAS Cherry Point AICUZ Program;
- City of Havelock and Craven and Carteret counties land use plans;
- City of Havelock and Craven and Carteret counties zoning ordinances;
- North Carolina Coastal Area Management Plan; and
- Natural Resources Management Plan, MCAS Cherry Point.

Master Plan, MCAS Cherry Point

The station master plan provides the Marine Corps with realistic and orderly development proposals for MCAS Cherry Point. The plan evaluates all aspects of the built and natural environments within the station and the surrounding region. The goal of the plan is to provide guidance in utilizing existing physical assets as well as future development of the air station and to provide an aesthetically pleasing and efficiently operating environment (LANTDIV 1988).

AICUZ Program

The goal and objective of the AICUZ program at the station is to encourage land use compatibility between the military air facility and local communities while maintaining the operational integrity of the station (See Section 3.1.4.2 for AICUZ definitions). The existing AICUZ footprint for MCAS Cherry Point is depicted on Figure 3.3-5 and includes APZs and noise exposure contours.

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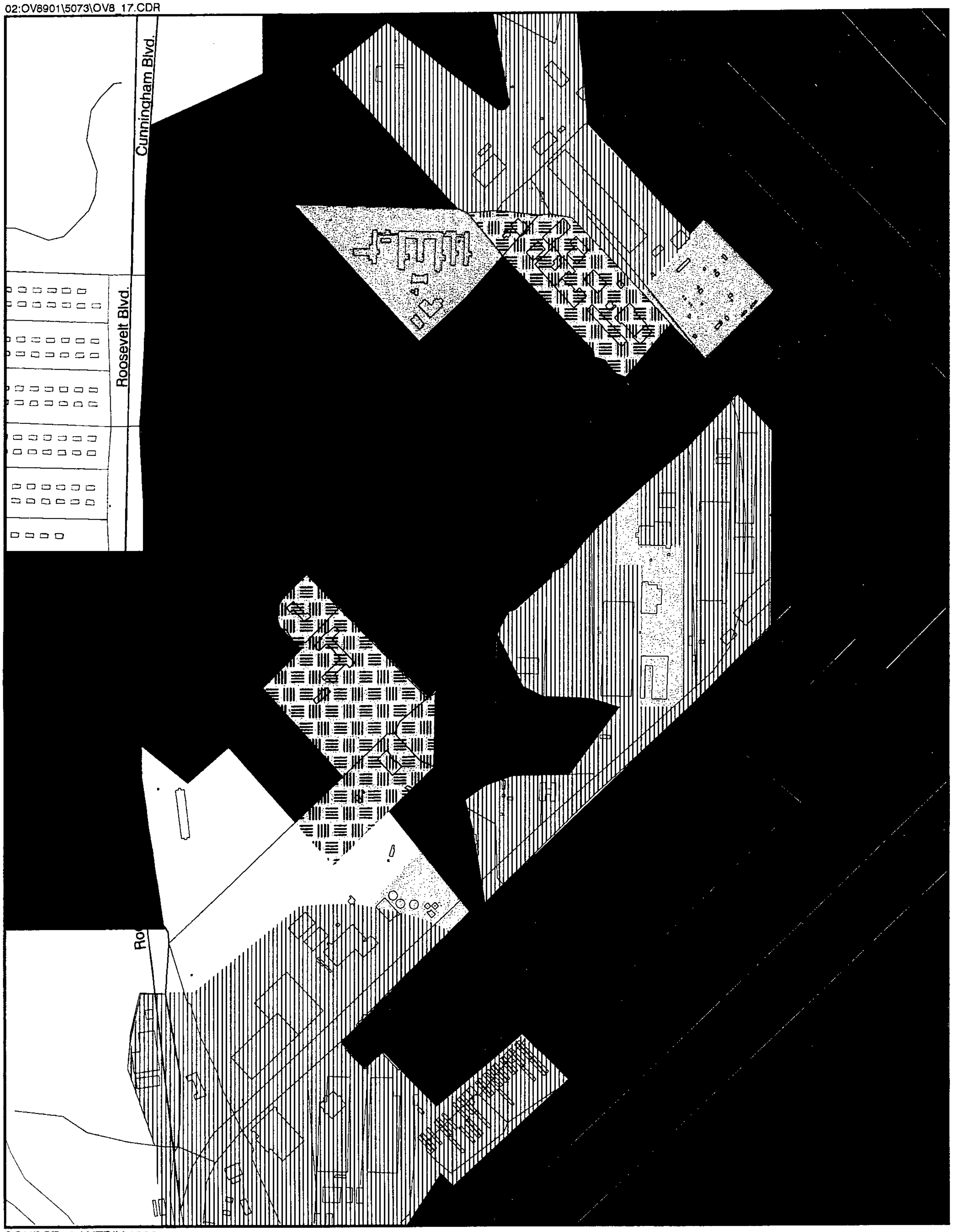
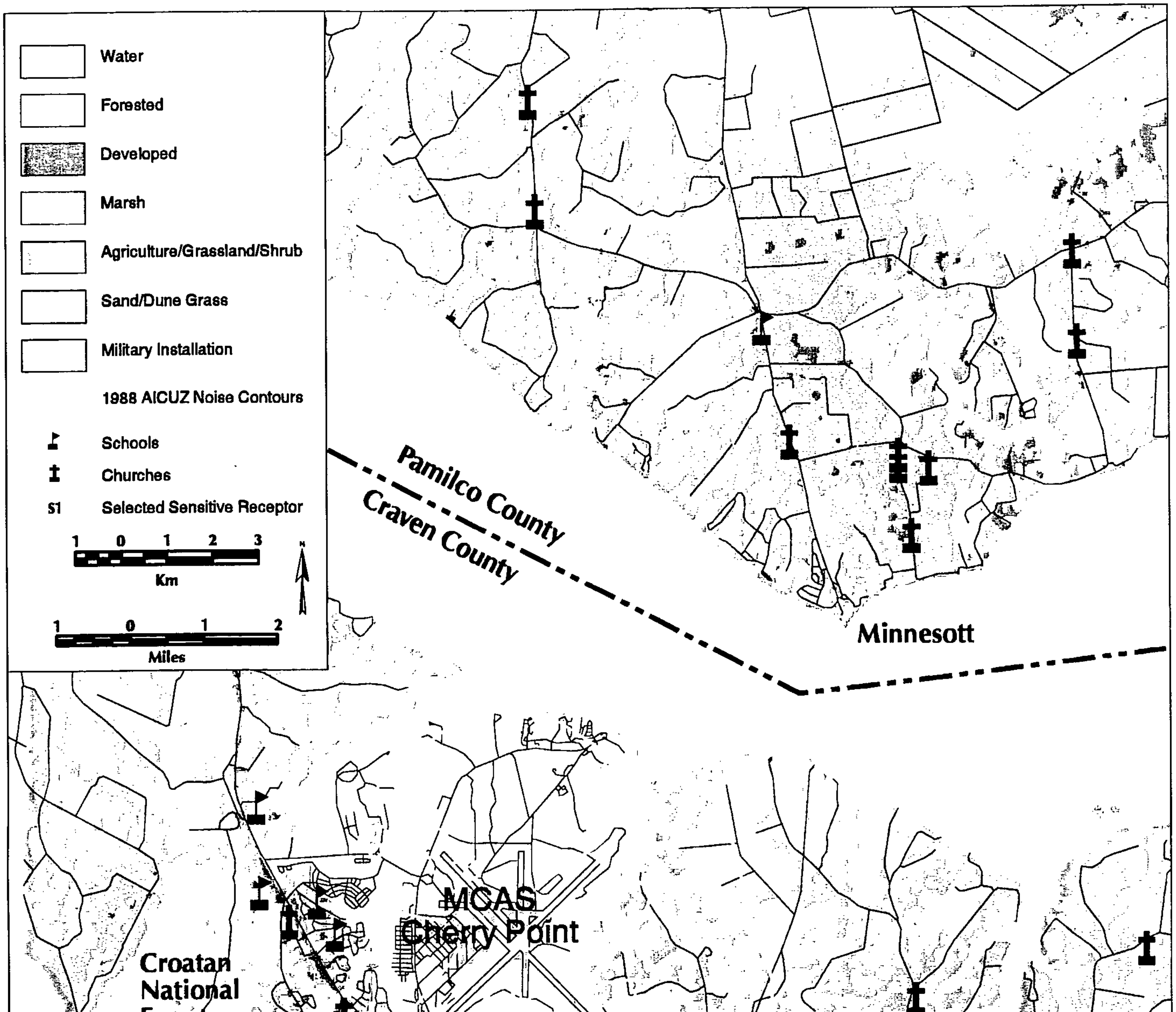


SOURCE: LANTDIV 1988

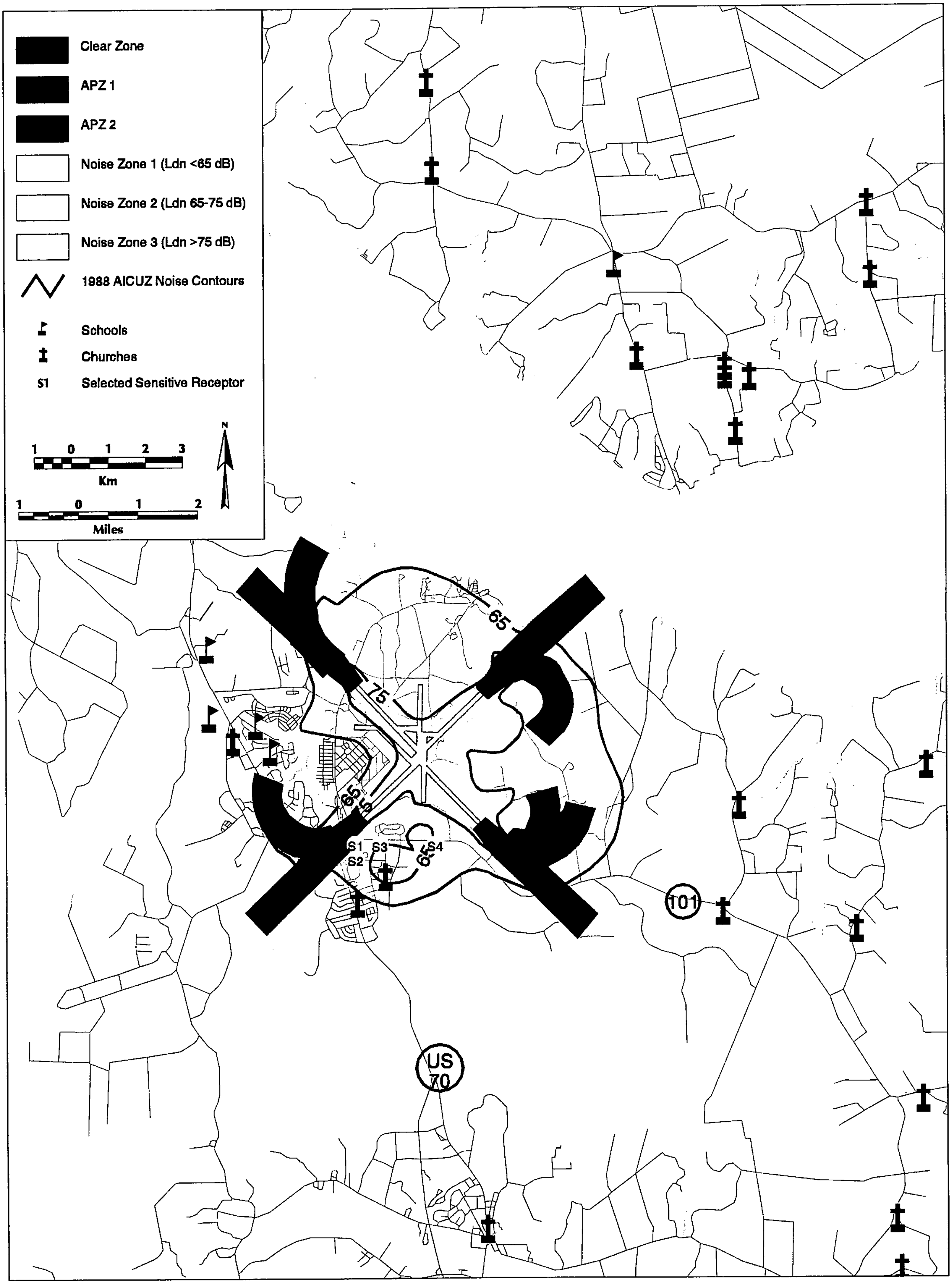
KEY:
- Flight Operations (flight line)
- Public Works
- Bachelor Enlisted Quarters, Bachelor Officers Quarters and Housing Support and Facilities
- Supply
- Maintenance and Operational Support
- Medical
- Family Housing
- Recreation
- Administration and Training
- Vacant, Open Space, and Forested

Figure 3.3-3 EXISTING LAND USE - MCAS CHERRY POINT CORE AREA



Source: NC Center for Geographic Information and Analysis 1996;
LANTDIV 1988

Figure 3.3-4
Surrounding Land Use/Land Cover - MCAS Cherry Point



Source: LANTDIV 1988

Figure 3.3-5
AICUZ Boundaries - MCAS Cherry Point

As presented on Figure 3.3-5, the three levels of APZs defined for Runways 5, 14, 23, and 32 are the clear zone and adjoining APZ 1 and APZ 2 areas. Land uses within the APZs are shown in Table 3.3-2 and Figure 3.3-6. All clear zones are within the boundaries of the station.

Land uses underlying APZs 1 and 2 include primarily undeveloped lands, such as marsh, forest, agriculture/grassland/shrub, and open water. Off Runway 5 to the southwest of the base is some developed use (primarily commercial) along U.S. Route 70 within APZs 1 and 2.

To mitigate potential noise incompatibilities with surrounding land uses, MCAS Cherry Point acquired approximately 1,550 acres (627 hectares) in easement restriction and 250 acres (101 hectares) in fee simple ownership between 1987 and 1992. The acquisition effort was concentrated in the APZs and high-noise zones of Runway 32 between NC 101 and NC 306. With these acquisitions, the station's program of restricting development on unimproved parcels within the APZs and high-noise areas is nearly complete (Phillips 1996).

Land Use Plans

The North Carolina Coastal Area Management Act (CAMA) requires the development of land use plans for coastal areas. The plans are developed in accordance with Subchapter 7B, "Land Use Planning Guidelines," of the North Carolina Administrative Code (NCAC), as amended November 1, 1989. The development of CAMA is North Carolina's response to the federal requirements of the Coastal Zone Management Act of 1972.

Because of their geographic locations, the City of Havelock and the counties of Craven and Carteret are required to develop land use plans under CAMA. The plans must contain a summary of data collection and analysis, an existing land use map, a policy discussion, and land classification. As part of the land use plan, the Coastal Resource Commission requires policy statements as defined in 15A NCAC 7B for each of the following topics: Resource Protection; Resource Production and Management; Economic and Community Development; Continuing Public Participation; and Storm Hazard Mitigation, Post-disaster Recovery and Evacuation Plans.

The policy statements for each topic must do the following:

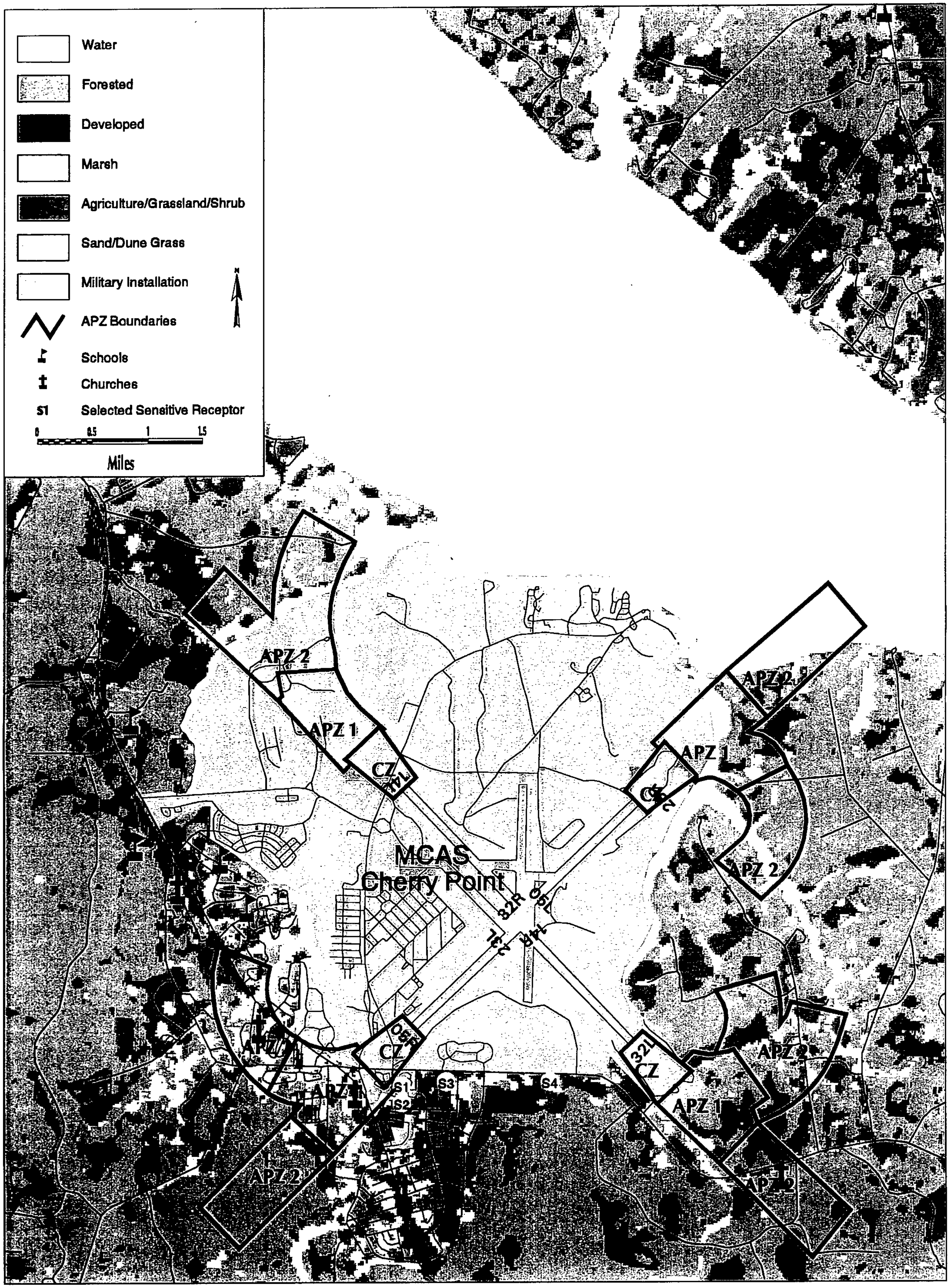
- Meet the state's minimum acceptable use standards defined in 15A NCAC 7H for issuance of CAMA permits within areas of environmental concern;

- Be related to and implemented by local land use ordinances such as zoning, development, or subdivision ordinances; and

Table 3.3-2

EXISTING LAND USE WITHIN
APZs AT MCAS CHERRY POINT

APZ	Land Use	Acres	Hectares
Clear Zone	Military Installation	520	212
APZ 1	Military Installation	537	218
	Forested	377	152
	Agriculture/Grassland/Shrub	273	110
	Marsh	205	83
	Water	80	32
	Developed	54	22
APZ 2	Forested	1,551	628
	Agriculture/Grassland/Shrub	598	242
	Water	371	150
	Marsh	364	147
	Military Installation	334	135
	Developed	66	26
TOTAL AREA		5,330	2,157



Source: NC Center for Geographic Information and Analysis 1996; LANTDIV 1988

Figure 3.3-6
MCAS Cherry Point Existing APZs and Land Use

- Pass consistency review; that is, proposals and applications for state and federal assistance or requests for agency approval of projects will normally be reviewed against a jurisdiction's land use plan to determine if the project is consistent with local policies.

The most recent updates to each jurisdictional land use plans are: City of Havelock, 1996; Craven County, 1995; and Carteret County, 1991. Each plan establishes resource protection policies for specific Areas of Environmental Concern (AECs), and a land classification system to support these policies. AECs in the vicinity of MCAS Cherry Point include: Public Trust Waters (i.e., Neuse River, Slocum Creek, Tucker Creek, and Hancock Creek) and significant coastal wetlands found along the shoreline of these waterbodies.

Zoning Ordinances

The City of Havelock and Craven and Carteret counties zoning ordinances set forth specific regulations regarding the development of lands within their jurisdictions. As federal facilities, MCAS Cherry Point and MCALF Bogue are exempt from jurisdictional zoning regulations.

The City of Havelock Zoning Ordinance was adopted on July 29, 1975, and establishes zoning regulations for the city within its incorporated limits and extraterritorial jurisdiction. The city's three general zoning districts are residential, business, and industrial. These districts are further subdivided into 12 subdistricts. Consistent with existing land use patterns, the predominant zoning in the city is residential, and transportation corridors are zoned highway commercial.

To address the specific requirements of the station's AICUZ, the city has adopted a highway commercial-air installation compatible use zone (HC-AICUZ) and light industrial-air installations compatible use zone (LI-AICUZ) as part of its zoning ordinance. These two zoning classifications address the specific needs of those lands located in APZ 1 and APZ 2 as identified in the station's AICUZ program. In addition, the city requires issuance of a Disclosure Statement as part of property sales around the station. The premise of the Disclosure Statement is that no person shall sell or lease, or offer for sale or lease, any property within the airport hazard area (e.g., MCAS Cherry Point's AICUZ) unless the prospective buyer or lease has been notified of restrictions on the development and use of the property (City of Havelock 1975).

The APZs of Runway 5 extend to lands regulated by the city. The APZ 1 lands are zoned highway commercial and light industrial with areas of residential. The APZ 2 is

primarily residential with areas of commercial zoning. In general, the residential zoning in APZ 1 and APZ 2 reflects existing land use conditions (Stone 1996).

The city is completing a new zoning ordinance which is expected to be finished in 1997. As part of the ordinance, land use restriction within the APZs will be consistent with AICUZ restrictions (Stone 1996).

Craven County does not have county-wide zoning; however, in 1989, the county did adopt as Appendix D of the Craven County Code, a Marine Corps Air Station Zoning Ordinance for the APZ of Runways 23 and 32 east of MCAS Cherry Point. The zoning ordinance addresses the county's land use objectives, conditions for development, and limitations to development for lands within the APZs and noise zones. For these areas, nine Airport Environs Zones were established to identify where certain developments are acceptable, conditional, or unacceptable. Craven County has also adopted the requirement of a Disclosure Statement (Craven County 1989).

The zoning ordinance for Carteret County, adopted on June 15, 1990, specifically covers the area surrounding MCALF Bogue. Although land east of MCALF Bogue was incorporated by the City of Bogue in 1995, Carteret County's zoning is still in effect because the city has contracted with the county for planning, zoning, and building inspection services. The majority of land in proximity to MCALF Bogue is zoned residential. The county does not have an AICUZ or Disclosure Statement program. However, for high noise zones, a statement of the noise condition is required to be printed on the recorded subdivision plat (Marshall 1996).

Coastal Area Management Plan

In 1978, the Federal Office of Coastal Zone Management approved, in accordance with the Coastal Zone Management Act of 1972, the North Carolina Coastal Management Plan, which includes the provisions of CAMA of 1974, Chapter 15, subchapter 7, of the North Carolina Administrative Code, and federally approved local land use plans.

For the purpose of a consistency determination, federal actions are required to be consistent, to the maximum extent practicable, with the enforceable policies of the North Carolina Coastal Area Management Plan; the CAMA of 1974, subchapter 7 of Chapter 15 of the North Carolina Administrative Code; and the approved local land use plans of Craven and Carteret counties and the City of Havelock.

Natural Resources Management Plan

MCAS Cherry Point developed their Natural Resources Management Plan in accordance with the DoD requirements outlined in Section 3.2.3.2, Natural Resources Management Plan. The station's Long-Range Multiple Natural Resources Management Plan was completed in 1980 and serves as a guide to managers of the natural resources at MCAS Cherry Point and MCALF Bogue, as well as BT-9 and BT-11, two target ranges administered by the station (see Section 3.1.3).

3.3.5 Socioeconomics and Community Services

3.3.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

At the beginning of FY 1996 (October 1, 1995), approximately 14,580 military and civilian personnel were assigned to MCAS Cherry Point, including the Naval Aviation Depot (NADEP). Personnel assigned included 900 officers, 7,800 enlisted personnel, and 5,880 civilians. Personnel loading at MCAS Cherry Point by major activity is shown on Table 3.3-3. The largest single activity on-station is the Second Marine Air Wing, which accounted for approximately 6,840 military personnel at the beginning of FY 1996 (Vanhovel 1996).

MCAS Cherry Point is located in Craven County, in eastern North Carolina, near the City of Havelock. The area surrounding the station includes Craven County, Carteret County, Jones County, and Pamlico County. Table 3.3-4 provides information on the geographical distribution of all personnel (military and civilian) employed at MCAS Cherry Point. As shown on the table, the majority of civilian and military personnel stationed at MCAS Cherry Point live in the four-county area, with the largest portion of these personnel residing in Craven County (74.1%), distantly followed by Carteret County (18.0%).

There is a significant difference in commuting patterns between military and civilian personnel. As a whole, military personnel choose to live closer to MCAS Cherry Point than do civilian personnel. Approximately 88.7% of the military personnel assigned to MCAS Cherry Point live in Craven County, compared to only 55.1% of the civilian population. Similarly, nearly 7.5% of the military personnel live in Carteret County, compared with 31.7% of the civilian labor force (see Table 3.3-4).

According to the *1990 Census of Population and Housing*, Craven County, with 81,613 residents, has the largest population in the four-county area. The City of Havelock,

Table 3.3-3

PERSONNEL LOADING AT MCAS CHERRY POINT
AT BEGINNING OF FISCAL YEAR 1996

Activity/Tenant	Officers	Enlisted	Civilians	Total
Second Marine Aircraft Wing (2d MAW)	670	6,170	0	6,840
H & HS	80	940	0	1,020
SOES	20	120	0	140
RSU	0	10	0	10
Naval Aviation Depot (NADEP)	20	50	3,840	3,910
CSSD—21	20	260	0	280
Naval Hospital Cherry Point	70	210	0	280
Naval Dental Clinic	10	40	0	50
DLA	10	0	0	10
MCAS Cherry Point	0	0	1,920	1,920
Other Tenants	0	0	120	120
Total	900	7,800	5,880	14,580

Source: Vanhovel 1996.

Key:

H & HS = Headquarters and Headquarters Squadron.
SDES = Station Operations and Engineering.
RSU = Reserve Support Unit.
CSSD = Combat Service Support Detachment.
DLA = Defense Logistics Agency.
MCAS = Marine Corps Air Station.

Table 3.3-4

GEOGRAPHICAL DISTRIBUTION OF MILITARY AND CIVILIAN PERSONNEL BY PLACE OF RESIDENCE

County	% of Military Personnel	% of Civilians	% of Military & Civilian Personnel
Craven	88.7%	55.1%	74.1%
Carteret	7.5%	31.7%	18.0%
Jones	0.1%	1.7%	0.8%
Pamlico	0.0%	2.7%	1.2%
Others	3.7%	8.8%	5.9%
Total	100.0%	100.0%	100.0%

Source: MCAS Cherry Point 1996.

which is located in Craven County, accounted for nearly 25% of all residents living in the county with a 1990 population of 20,268 people.

Population growth rates varied extensively throughout the four-county area surrounding the station between 1980 and 1990. As shown on Table 3.3-5, between 1980 and 1990 the region as a whole experienced a 17.2% increase in population. However, this growth was not evenly distributed throughout the area. Carteret County had the highest growth rate in the region (27.9%), while Jones County experienced a -3.1% growth rate during the last decade (see Table 3.3-5).

The region is expected to continue to follow its current population trends through the end of this century. Table 3.3-6 provides population projections for 1997 through 2001. All four counties are expected to increase in total population.

Economy, Employment, and Income

MCAS Cherry Point has a significant beneficial impact on the economy in the area surrounding the station. Each year, the station injects more than $500 million into the local economy. Military and civilian payrolls account for the majority of these expenditures, reaching nearly $450 million a year. Purchasing/contracting and construction activities accounted for the remaining expenditures ($74 million) in the region (MCAS Cherry Point 1996).

Service industries and retail and wholesale trade establishments are the largest employment sectors in the region. According to the U.S. Census, service industries employ

Table 3.3-5 TOTAL 1980, 1990, AND CURRENT[a] POPULATION IN COUNTIES SURROUNDING MCAS CHERRY POINT				
County	1980	1990	Current	Percent Change 1980 to 1990
Craven	71,043	81,613	86,312	14.9
Carteret	41,092	52,553	57,050	27.9
Jones	9,705	9,414	9,425	-3.1
Pamlico	10,398	11,368	11,682	9.3
Total	132,238	154,948	164,469	17.2

[a]Figures as of 1994.

Source: U.S. Bureau of the Census 1992.

Table 3.3-6 POPULATION PROJECTIONS FOR COUNTIES LOCATED IN THE REGION SURROUNDING MCAS CHERRY POINT FROM 1997 TO 2001					
County	1997	1998	1999	2000	2001
Craven	87,012	88,049	89,142	90,213	91,187
Carteret	59,796	60,791	61,785	62,730	63,537
Jones	9,600	9,594	9,580	9,568	9,552
Pamlico	11,980	12,063	12,145	12,217	12,256
Total	168,388	170,497	172,652	174,728	176,532

Source: North Carolina Office of State Planning 1996.

29% of the labor force, and wholesale and retail trades employ 23% of the labor force. Other major employment sectors in the region included manufacturing (15%); public administration (10%); and construction (8%) (U.S. Bureau of the Census 1992).

Employment by sector varies greatly among the counties. Jones and Pamlico counties have a much larger portion of their labor force employed in the agricultural and fishing industries than do Craven or Carteret counties. Similarly, wholesale and retail trade provides a much larger proportion of the total jobs in Craven and Carteret counties than in Pamlico or Jones counties (U.S. Bureau of the Census 1992).

As shown on Table 3.3-7, unemployment rates in the region are slightly higher than the unemployment rate for the State of North Carolina as a whole. Craven County currently has the lowest average annual unemployment rate in the region (5.3%), and Pamlico County has the highest annual average unemployment rate (6.1%) (Terwilliger 1996).

Table 3.3-7

1994 AND CURRENT[a] LABOR FORCE STATISTICS FOR THE COUNTIES SURROUNDING MCAS CHERRY POINT AND FOR THE STATE OF NORTH CAROLINA

County	1994 Civilian Labor Force	1994 Unemployment Rate %	Current Civilian Labor Force	Current Unemployment Rate %
Carteret	26,746	5.7%	27,331	5.7%
Craven	33,407	5.9%	33,882	5.3%
Jones	4,386	4.9%	4,502	5.4%
Pamlico	5,171	5.6%	5,305	6.1%
Total	69,710	5.8%	71,020	5.5%
State of North Carolina	3,589,556	4.4%	3,636,142	4.3%

[a]Figures as of 1995.

Source: Terwilliger 1996.

Per capita income figures vary dramatically throughout the region. For example, Jones County and the City of Havelock reported per capita income figures of $8,832 and $9,204, respectively, which were significantly less than the statewide average of $12,885. In contrast, Carteret County reported per capita income of $13,227, which was substantially greater than the statewide average. Craven County's per capita income of $11,619 was slightly less than the statewide average (U.S. Bureau of the Census 1992).

Housing

The United States Marine Corps provides bachelor (officer and enlisted) and family housing to eligible military personnel stationed at MCAS Cherry Point. There are 52 spaces in BOQs and 3,500 spaces in BEQs located on MCAS Cherry Point. Currently, these BOQs and BEQs house approximately 50 officers and 3,680 enlisted personnel, respectively. These figures include approximately 20 officers and 260 enlisted personnel who are classified as "geographical bachelors" (i.e., personnel who are married but are voluntarily separated from their spouse). These individuals continue to receive Basic Allowance for Quarters (BAQ) and

Variable Housing Allowance (VHA) at the married rate. Geographical bachelors are allowed to live in the BOQs and BEQs on a space-available basis only (Small 1996).

Currently at MCAS Cherry Point, the BOQs and BEQs are experiencing 92% and 95% occupancy rates, respectively. When geographical bachelors are removed from these calculations, these figures fall to 58% and 87%, respectively. The vast majority (87%) of personnel residing in the BEQs are E4s and below. The remaining BEQ spaces are filled by E5s (8%) and E6s and above (5%) (Small 1996).

In addition to the bachelor quarters, MCAS Cherry Point also provides family housing to eligible personnel. Currently, MCAS Cherry Point maintains 2,764 family housing units and 76 mobile home spaces. Average occupancy of these units is approximately 98%. Depending on rank and the number of bedrooms required, military personnel may have to wait up to six months for family housing. Typically, the waiting list for E1 to E3 personnel is four to six months; for E4 and E5 personnel it is zero to two months; E6 to E9 personnel typically do not have to wait; and officers usually must wait between one and two months for a family housing unit (Merrell 1996).

The most recent tabulation of the family housing survey at MCAS Cherry Point estimated the total family housing requirement, which is the number of units required to house all military personnel with dependents assigned to MCAS Cherry Point in public or private housing units, to be approximately 3,725 housing units (U.S. Navy 1994b).

According to the U.S. Bureau of the Census, there are nearly 76,750 housing units in the region surrounding the station. As shown on Table 3.3-8, this total includes approximately 32,300 units in Craven County and 34,580 units in Carteret County.

The median value of owner-occupied housing units and the median contract rent are also provided on Table 3.3-8. As shown on the table, the median value of owner-occupied units range between $43,700 in Jones County and $73,100 in Carteret County. Corresponding to the large range in property values in the region, rental prices also vary quite significantly.

According to the *Family Housing Market Analysis* completed for MCAS Cherry Point, rental rates for one- and two-bedroom units range from $100 to $1,000 per month with the median rental rate of these units at $349 per month. Rents for three-bedroom units vary between $175 and $1,100 per month with the median rent for these three-bedroom units at $495 per month. Rental properties with more than four-bedrooms have rents that range between $250 and $1,200 per month and a median rental rate of approximately $650 per month (Robert D. Niehaus, Inc., 1994).

Table 3.3-8 SELECTED HOUSING CHARACTERISTICS FOR COUNTIES SURROUNDING MCAS CHERRY POINT					
County	Total Housing Units	Median Value of Owner-Occupied Housing Units	Homeowner Vacancy Rate	Median Contract Rent	Rental Vacancy Rates
Craven	32,293	$65,900	1.6%	$302	7.4%
Carteret	34,576	$73,100	2.1%	$280	31.2%
Jones	3,829	$43,700	0.7%	$164	7.6%
Pamlico	6,050	$54,300	0.9%	$219	7.9%
Total	76,748	NA	NA	NA	NA

Source: U.S. Bureau of the Census 1992.

The majority (57.2%) of the housing stock in the area is detached, single-family structures. The remaining housing stock consists of attached, single-family (4.6%), duplexes (3.1%), multi-family units (11.4%), mobile homes (22.9%), and other units (0.8%) (U.S. Bureau of the Census 1992). Table 3.3-9 provides a breakdown by type of unit for each county in the region.

Table 3.3-9 COMPOSITION OF HOUSING UNITS IN THE COUNTIES SURROUNDING MCAS CHERRY POINT							
County	Single-Family	Single-Family Attached	Duplexes	Multifamily	Mobile Homes	Other	Total
Craven	61.0%	7.0%	3.0%	11.6%	16.7%	0.8%	100.0%
Carteret	50.6%	3.5%	3.9%	14.1%	27.2%	0.7%	100.0%
Jones	71.4%	0.4%	0.3%	1.7%	25.3%	0.8%	100.0%
Pamlico	65.2%	0.9%	0.7%	1.5%	30.3%	1.4%	100.0%
Total	57.2%	4.6%	3.1%	11.4%	22.9%	0.8%	100.0%

Source: U.S. Bureau of the Census 1992.

Taxes and Revenues

Ad valorem (property) tax is the largest single revenue source for the city and county governments in the region. Other major revenue sources include sales tax, intergovernmental

transfers, sales and services, interest/investment earnings, and permits, licenses, and fees. Table 3.3-10 provides a breakdown of major revenue sources and expenditures for Craven and Carteret counties and for the City of Havelock. These three municipalities have been chosen because they are expected to receive the largest fiscal impact from the proposed realignment under ARS 3 or ARS 5. Likewise, the infrastructure and various public services and facilities in these communities will experience the greatest impact from the proposed action.

As shown on the table, during the last fiscal year, property taxes raised 46% of Carteret County's total revenue and 41% of Craven County's total revenue. Likewise, the City of Havelock collected 36% of its total revenues from ad valorem taxes. Intergovernmental transfers and sales taxes accounted for the next largest revenue sources (see Table 3.3-10).

Education and human services are the largest single expenses for Craven and Carteret counties. As shown on Table 3.3-11 approximately 29% of Carteret County's total expenditures and 24% of Craven County's total expenditures are used for education while 21% and 30%, respectively, are spent on social services. Other major expenditures include public safety, health programs, environmental protection, and general government.

The City of Havelock's expenditures are substantially different from those of Craven and Carteret counties. Educational expenses and social service programs are provided by county government and, therefore, are not the responsibility of the City of Havelock. Public safety and highway and street expenditures accounted for the largest proportion of the city's overall spending. Other major expenses are general government, cultural, development, recreation, and sanitation (see Table 3.3-11).

3.3.5.2 Community Services

Fire and Emergency Services

The MCAS Cherry Point Fire Department provides fire fighting and hazardous materials services to the station and the Slocum Village Family Housing Area. The department maintains three fire stations: one is located on the main part of MCAS Cherry Point near the gymnasium; one is located on Roosevelt Boulevard; and the third fire station is located in the Slocum Village Family Housing Area. The department currently has a staff of 44 fire fighting personnel who maintain and operate three engine companies and one HAZ-MAT vehicle (Moore 1996).

Fire and emergency services off station and outside of the military family housing areas are supplied by the county/municipal fire departments. Craven County has 29 volunteer

Table 3.3-10

LOCAL GOVERNMENT REVENUES BY SOURCE FOR SELECTED COMMUNITIES IN THE REGION SURROUNDING MCAS CHERRY POINT

Source	Craven County		Carteret County		City of Havelock	
Ad Valorem Taxes	$19,907	41%	$18,247	46%	$1,161	36%
Sales Tax[a]	$9,761	20%	$9,603	24%	$410	13%
Intergovernmental Transfers	$12,209	25%	$6,963	17%	$1,320	40%
Licenses, Permits, Fees, and Other Taxes	$5,569	11%	$1,085	3%	$64	2%
Investment Income	$580	1%	$844	2%	$136	4%
Sales and Services		0%	$1,801	5%	$67	2%
Miscellaneous	$508	1%	$1,371	3%	$105	3%
Total	$48,534	100%	$39,914	100%	$3,263	100%

Note: Figures may not total due to rounding. Figures in thousands.

a Other taxes are included in this figure for Carteret County and the City of Havelock.

Sources: City of Havelock n.d.; Carteret County n.d.; and Craven County n.d.

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Table 3.3-11

LOCAL GOVERNMENT EXPENDITURES BY USE FOR SELECTED COMMUNITIES IN THE REGION SURROUNDING MCAS CHERRY POINT

Use	Craven County		Carteret County		City of Havelock	
Education	$10,533	24%	$12,033	29%		0%
Human/Social Services	$13,026	30%	$8,379	21%		0%
General Government	$3,501	8%	$2,234	5%	$774	23%
Public Safety	$5,205	12%	$5,530	14%	$1,433	44%
Environmental Protection	$2,674	6%	$3,493	9%	$78	2%
Debt Service	$1,796	4%	$3,432	8%		0%
Cultural, Development, and Recreation	$1,932	4%	$2,928	7%	$344	10%
Health	$5,206	12%		0%		0%
Transportation		0%	$142	0%	$665	20%
Other		0%	$2,698	7%		0%
Total	$43,873	100%	$40,869	100%	$3,294	100%

Note: Totals may not be exactly 100% due to rounding. Figures in thousands.

Source: City of Havelock n.d.; Carteret County n.d.; and Craven County, n.d.

fire stations located throughout the county. These stations are served by approximately 500 fire fighters. In addition, the county has seven volunteer rescue squads, which are served by nearly 240 volunteer rescue squad attendants (Craven County Finance Department n.d.).

There is one volunteer fire station located in the City of Havelock. The station is staffed by 26 volunteer fire fighters. In addition, the city has one volunteer rescue squad, which is operated by 29 volunteers (City of Havelock Finance Department n.d.).

Fire fighting and emergency services in Carteret County are supplied by 24 fire stations spread throughout the county. The stations are manned by 612 fire fighters. Typically, the department responds to 1,800 emergency calls a year and completes approximately 3,000 fire inspections annually (Carteret County Finance Department n.d.).

Security Services

There are approximately 170 security personnel at MCAS Cherry Point. The MCAS. Cherry Point Provost Marshall is responsible for manning four perimeter gates (two of which are manned only during peak traffic flow hours) and at least one flight line gate at all times. The department uses 19 vehicles and 15 bicycles to patrol the station. The department typically responds to more than 3,000 emergency calls a year (Rook 1996).

MCAS Cherry Point does not have mutual aid agreements with the local communities. Military police have proprietary jurisdiction over the station and the Slocum and Ft. Macon housing areas. However, criminal incidents involving civilians are normally referred to the City of Havelock Department of Public Safety (Rook 1996).

Security services for all off-station areas are provided by the local community police forces. The City of Havelock has one police station and 23 police officers who provide security services to the community. Likewise, Craven and Carteret counties have 52 and 48 police officers, respectively (City of Havelock Finance Department n.d.; Craven County Finance Department n.d.; and Carteret County Finance Department n.d.).

Medical Services

The Naval Hospital Cherry Point, which is located in Building 4389 on MCAS Cherry Point, provides medical and administrative support to all military personnel assigned to the station and eligible military dependents. The Naval Hospital is staffed by approximately 70 officers, 180 enlisted personnel, and 120 civilian employees. The Naval Hospital is equipped to provide for the primary medical needs of all eligible personnel residing in the surrounding areas. The hospital, which was built in October 1994, is a 202,000-square-foot primary-care facility that has 24 medical/surgical beds, two operating rooms, three birthing

rooms, a 13-bed nursery, 29 dental treatment rooms, and support services for outpatient care. In recent years, the Naval Hospital Cherry Point has had 2,200 to 2,500 inpatients and 161,000 to 185,000 outpatients each year.

In addition to the military medical facilities, two civilian hospitals are located in the region: the 117-bed Carteret General Hospital in Morehead City and the 302-bed Craven County Regional Medical Center in the City of New Bern.

Recreational Facilities

The Morale, Welfare, and Recreation Department (MWR) at MCAS Cherry Point provides a full range of recreational services and on-station facilities to military personnel and their dependents. The MCAS Cherry Point MWR Department operates three marinas (two rent out various types of boats, and one is a 95-slip marina designed for private boats); a 1,996-seat theater; two 50-meter swimming pools and one 25-meter swimming pool; a 24-lane bowling alley; three fitness centers (officers, enlisted, and women's); athletic fields; tennis and basketball courts; an 18-hole golf course; an auto hobby shop; and an arts-and-crafts facility (Kearney 1996).

The local communities surrounding MCAS Cherry Point also have numerous recreational facilities available to the public. The majority of these facilities revolve around water-related recreational activities such as boating, swimming, scuba diving, waterskiing, surfing, and fishing. In addition to numerous county and municipal parks and athletic fields, Cape Lookout National Seashore Park, Fort Macon State Park, and the Croatan National Forest are located in the region.

Education

School-age children residing in military family housing on MCAS Cherry Point attend the Craven County public schools. All middle school and high school students living on-station attend the Havelock Middle School and the Havelock Senior High School. Elementary-school aged children living in military-controlled housing attend either the Roger Bell Elementary School, the Havelock Elementary School, the Arthur W. Edwards Elementary School, or the Graham A. Barden Elementary School (Merrell 1996).

The Craven County School District operates 21 schools (14 elementary schools, four middle schools, and three high schools). A new middle school is currently under construction and is expected to be completed by the 1997-1998 school year (Bruins 1996). Total enrollment in the school system is approximately 14,220 students. Nearly 7,590 of these students are enrolled in elementary schools (K through 6 grades); 3,060 students attend

middle schools; and the remaining 3,570 students are enrolled in high school (Bruins 1996). Since 1988, the Craven County School District has experienced fluctuations in the number of enrolled students. During this time period, total enrollment has ranged from a high of 14,650 students in 1993 to a low of 14,050 students in 1989 (Franks n.d.).

According to 1994-1995 capacity data, the school buildings operated by the Craven County School District were designed to accommodate a maximum of 15,678 students. Elementary/primary schools had a maximum design capacity of 7,678 students; middle and junior high schools had a maximum design capacity of 3,960 students; and high schools had a maximum design capacity of 4,040 students. When these figures are compared to current enrollment figures, the Craven County School District has an excess capacity of nearly 1,460 students. When the new middle school is completed, this excess capacity will be even greater.

As described in previous sections, school districts heavily impacted by major military or federal installations receive federal impact aid from the U.S. Department of Education. During the past fiscal year, the Craven County School Board received a total of approximately $1,750,000 in impact aid from the federal government to help cover costs incurred for educating federally connected students (Franks n.d.). In 1995, the most recent year for which data for the Craven County Schools are available, the average daily attendance of military dependents who resided on federal property was 1,669 students. During the same time period the average daily attendance of students who lived on private property but had at least one parent in the military was 1,141 students (Thurmond 1996).

The Carteret County School System consists of 14 schools (eight elementary schools, three middle schools, two high schools, and one alternative high school) that serve the entire county. In November 1994, a $29-million bond referendum was passed to fund the construction of a new high school and a new elementary school in the western portion of the county and various other expansion and renovation programs at several other schools (Nance 1996). Current enrollment in the Carteret County schools is approximately 8,260 students. Approximately 49% of these students (4,045 students) are elementary school children, 23% (1,878 students) are middle-school aged, and the remaining 28% (2,337 students) are high-school aged (Nance 1996).

Capacity data for 1994 show that school buildings operated by the Carteret County schools could accommodate a maximum of 8,550 students. These figures are further broken down into types of schools. Elementary and primary schools in the district can accommodate a maximum of 4,300 students; middle and junior high schools can accommodate a maximum of 1,950 students; and high schools can accommodate a maximum of 2,010 students. When

existing capacity and current enrollment figures are compared, they show that Carteret County schools could handle an additional 290 students before reaching their design capacities. When the construction of the new high school and elementary school and the expansion of existing schools that will be funded under the 1994 bond referendum are completed, total capacity of the Carteret County schools will be much greater.

In 1995, the Carteret County Schools spent approximately $4,812 per student. This figure was slightly more than the $4,436 spent the previous year (Nance 1996). The Carteret County School District does not receive any U.S. Department of Education impact aid for federally connected students that attend its schools.

3.3.6 Infrastructure and Utilities

3.3.6.1 Water Supply

MCAS Cherry Point

Water is supplied to MCAS Cherry Point through 27 on-station wells completed into the Castle Hayne Aquifer. Each well has a design pumping capacity of 250 gallons per minute (gpm). Eight of the wells have back-up generators for the groundwater pumps in case of electric failure. At present, MCAS Cherry Point has discontinued the use of four wells because of contamination plumes near the radius of influence of the wells. The four wells not in use will be replaced by two wells with design pumping capacities of 500 gpm each (Breary 1996).

There are six elevated potable-water storage tanks at the station and two ground storage tanks for fire fighting. Total aboveground storage capacity is approximately 1.2 million gallons (two 100,000-gallon tanks and four 250,000-gallon tanks). In addition, there is a 650,000-gallon, clear well storage tank underneath the water treatment plant. The aboveground tanks operate under an equalization system; that is, a system in which each tank maintains the same static level. The station's elevated water tank (Structure 115) has been devalved from the water storage and distribution system because of water quality problems (primarily bacteria regrowth) caused by prolonged storage (Breary 1996).

Upgrades to the water treatment plant were completed in January 1995. As a part of the upgrade, the design capacity of the facility was increased from 4 MGD to 6 MGD (i.e., an excess capacity of 2.0 MGD). Average daily water usage at MCAS Cherry Point is approximately 3.4 MGD. The treatment of raw water consists of caustic softening, ozone disinfection, sand filtration, and residual chlorine and fluoride removal. Bacteria regrowth is

occurring in some of the water distribution lines in the core, MACS-6, rifle range, navy boat dock, and range road areas primarily due to excessive pipe size required for fire fighting. In parts of the housing area, regrowth is occurring due to redundance in piping (i.e., water pipes on both sides of the street) resulting in stagnation of water. Installation of a separate 2- to 4-inch potable water line is proposed to fix the excessive pipe size problem (Breary 1996).

Regional Systems

City of Havelock. Nearly all residences and businesses in the City of Havelock receive water from the city's system. The city has four wells completed to a depth of approximately 165 feet below ground surface (BGS) into the Castle Hayne Aquifer. The city has two water treatment plants and four groundwater wells (two wells per plant) with a combined pumping capacity of 3.6 MGD. However, because only one well per plant is operating at a time (wells are rotated), the pumping capacity is actually 2.2 MGD. On average, about 1.2 million gallons is pumped per day. The current system has a 1.8 million-gallon storage capacity, with approximately 0.8-million gallon surplus storage, and 50 miles (80 kilometers) of water lines. The city is planning construction of a fifth groundwater well which will be connected to an existing plant. The distribution system and water treatment plants are in good condition and have adequate capacity to serve new development (Hartmann 1996).

Craven County. Within Craven County there are several independently operated water systems principally serving municipalities and MCAS Cherry Point. Most of the areas not served by a municipal system are served by the county water supply system. Craven County has four wells that tap into the Black Creek Aquifer. Each well has a design pumping capacity of 1 MGD; however, only three wells can operate at the same time due to the proximity of two wells and their effect on groundwater drawdown. The county maintains approximately 350 miles (563 kilometers) of distribution lines, eight elevated storage tanks with an approximately 2-million-gallon potable water storage capacity, and three booster pump stations, which activate when water levels in the elevated storage tanks drop. The water system serves the area between New Bern and Havelock and the northern and western portions of the county: Townships 1, 3, 6, 7, 9, and portions of Township 8. The water system serves approximately 8,600 customers, who use approximately 1.4 MGD. Because of the pure quality of the groundwater, treatment consists only of chlorine disinfection (Hayes 1996).

The county is in the first phase of a $1.3-million upgrade to its water pumping and distribution system. This includes the installation of a 12-inch distribution line and the connection of well four to the system for utilization. Additionally, upgrades include a 300,000-gallon distribution system planned for Township 5 (Hayes 1996).

Carteret County. Carteret County does not own or operate any community water supply systems. The majority of the residents in the unincorporated areas of the county rely on private wells for potable water. There are, however, a number of municipal and private central water systems within the county that obtain water from the Yorktown/Castle Hayne formation.

3.3.6.2 Wastewater System

MCAS Cherry Point

MCAS Cherry Point maintains a separate industrial wastewater treatment plant (IWTP) and sanitary sewage treatment plant (SSTP). Upgrades and modifications to the IWTP were completed in January 1996. The plant has a design treatment capacity of 0.6 MGD and a hydraulic capacity of 0.9 MGD. Hydraulic capacity is the flow rate at which the plant can process, but not effectively treat, wastewater. The IWTP has experienced a peak instantaneous flow rate of 2 MGD, which exceeded the hydraulic flow rate. The wastewater treatment process consists of primary settling; equalization; chemical reduction for chromium and cyanide; up-flow clarification for metal precipitation; and polishing through the process of pressure filtration, VOC-stripping, and carbon filtration. Effluent from the IWTP is transported to the SSTP for final treatment and disposal. The industrial sludge is dewatered using a filter press, and disposed of by contract in approved hazardous waste landfills in South Carolina (Breary 1996).

The SSTP has a design flow capacity of 3.32 MGD and a hydraulic capacity of 7.5 MGD. The station's NCNPDES permit allows the discharge of 3.5 MGD into the Neuse River. Average discharge at the station is approximately 3 MGD. Influent from the wastewater conveyance system is distributed to one of three lift stations. The interconnected lift stations feed one line directly to the SSTP. The sewage is treated through primary clarification, active sludge system, secondary clarification, rapid sand filtration, chlorine contact, dechlorination, and effluent discharge. Effluent from the treatment plant is transported approximately 2.5 miles (4 kilometers) through a 24-inch (61-centimeter) diameter pipe along Roosevelt Boulevard and Jackson Street. Prior to final discharge into the Neuse River, post aeration

occurs to increase levels of dissolved oxygen. After post aeration, the effluent is discharged at a point 3,200 feet (975 meters) into the Neuse River through a series of diffusers. Sludge generated at the plant goes through a gravity-thickening anaerobic process and is disposed of along the runways at permitted locations (Breary 1996).

Both the SSTP and IWTP conveyance systems have an inflow/infiltration problem that is currently under investigation (Breary 1996).

Regional Systems

City of Havelock. The City of Havelock's SSTP has a design capacity of 1.5 MGD, a hydraulic flow capacity of 2.25 MGD, and a present flow rate of 1.25 MGD (i.e., an excess capacity of 0.25 MGD). To increase the quality and quantity of wastewater treatment, the city is in the process of a phase I upgrade to the SSTP. The project is expected to be completed by January 1998. At completion of the project, the design capacity of the plant will be between 2.25 and 2.5 MGD. The modified treatment process at the plant will consist of screening, grit removal, activated sludge for removing carbonaceous and nutrient materials, final clarifiers, tertiary filters, chemicals for additional nutrient removal, UV disinfection and re-aeration. Excess solids will be thickened, lime stabilized, and land applied. The NCNPD-ES permit discharge rate into Slocum Creek will increase from 1.5 to 1.9 MGD; however, a significant reduction in discharge limitations (i.e., levels of pollutants) will be required. The city is also planning a phase II project involving the land application/spray of effluent discharge. The purpose of the project is to receive a permit to increase the discharge rate above 1.9 MGD; however, the project would also reduce discharge into Slocum Creek by diverting effluent to the land application system. The city is also planning a collection system upgrade for the west part of town. The city has 17 back-up generators, one at each of the major pumping stations and has recently upgraded the back-up power source at the SSTP. Inflow/infiltration into the collection system is a problem that is estimated to be approximately 15% of the effluent discharge (Rexrode 1996).

Craven County. Most residents in the unincorporated parts of Craven County rely upon individual septic tanks for sewage disposal. The county does, however, operate and maintain a sewage treatment system serving approximately 1,650 customers in Township 7. The system is a septic tank effluent pump system, operating on a low-pressure force main application. In this system, each house maintains a septic tank and has its own pump station. From the pump station at the house, the sewage is either transported to a two-cell facultative

lagoon which can treat 250,000 gpd or to one of two activated sludge wastewater treatment plants. The effluent from the facultative lagoon is permitted to be discharged as land application to a 105-acre farm (Arthur Farm) for spraying crops. The system is permitted to spray 250,000 gpd, although the farm can only absorb about 210,000 gpd. During periods of heavy rain, rainwater leaks into the septic system, flows in the lagoon increase, and the quantity of spray that can be effectively discharged is reduced. These conditions have resulted in lagoon overflow. To mitigate the overflow problem, the county is in the process of securing a permit for a 450,000-gpd land application system (Hayes 1996).

The two activated sewage sludge treatment plants have the capacity to treat 75,000 gpd and 100,000 gpd, respectively. Effluent from the 75,000 gpd plant is discharged into Tucker Creek and the effluent from the 100,000 gpd plant is discharged into the Neuse River. The 100,000 gpd plant is approaching capacity (Hayes 1996).

Carteret County. Carteret County does not own or operate any wastewater collection or treatment systems. Wastewater disposal is provided by municipally-owned systems, public/private package treatment and disposal systems, and individual septic tank systems. An estimated two-thirds to three-fourths of the county's year-round population relies on septic tank systems (Holland Consulting Planners, Inc. 1991).

3.3.6.3 Stormwater

Stormwater at MCAS Cherry Point is conveyed through a system of flat swales, open ditches and buried piping that discharge into Slocum Creek, Hancock Creek, and the Neuse River. In addition, approximately 20 stormwater detention/retention ponds have been constructed for specific buildings and facilities at the station.

In 1993, a Stormwater Management Plan (SMP) was prepared as a requisite for a NPDES permit for stormwater discharge. Preparations are underway to replace the SMP with a Stormwater Pollution Prevention Plan, which will be referenced as part of the stormwater NPDES permit.

Best management practices at the station are being implemented to avoid contamination of stormwater from material storage and refueling areas. Potential sources of pollution at the station include flight-line operations; aircraft fueling/defueling areas; maintenance; painting; washing; unloading, transfer, and bulk fuel storage areas; equipment/maintenance storage; and repair areas.

A number of projects are underway to improve the quality and control of the stormwater runoff at the station. These projects include: maintaining the existing spill

control gates and the installation of additional spill control gates; improving the control of spills of aviation fuel at the flight line refueling areas; eliminating improper discharges into the stormwater conveyance system; and eliminating stormwater inflow into the wastewater treatment system (McSmith 1996).

3.3.6.4 Electrical

The Carolina Power and Light Company (CP&L) supplies power to the region. Municipalities and electric membership cooperations purchase power and distribute it to customers. In Craven and Carteret counties, electricity is purchased by the Craven-Carteret Electric Membership Cooperative.

CP&L provides power directly to MCAS Cherry Point, Slocum Village, Hancock Village, and the Staff Townhouse area. Power is provided to the station through three CP&L feed lines and two delivery substations. The original substation, which previously supported the entire station, is a 50-megawatt substation located at Slocum Road and Roosevelt Boulevard. A second delivery substation built in 1988, is a 20-megawatt substation located on Highway 101 (Breary 1996).

MCAS Cherry Point operates under a 42-megawatt peak capacity load (includes housing areas). The electrical system capacity is monitored and regulated through the Utility Monitoring and Control System (UMCS). When electric usage levels approach peak capacity, electricity can be diverted from low-priority areas (e.g., administration buildings) to high-priority areas such as aircraft maintenance and support facilities. The diversion of electric power is not typically required; however, during periods of extreme heat or cold, when electric usage increases, the diversion of power from low- to high-priority areas has occurred.

The 20-megawatt substation is approaching capacity limits; any substantial increase in demand on the substation may require a substation upgrade (Breary 1996).

3.3.6.5 Heating

Steam is generated at the Central Heating Plant, Building 152. The plant uses six permanent boilers to produce steam-generated heat, hot water, and some process steam. Process steam is used at the Naval Aviation Depot and wing buildings. Boiler numbers 1 and 2 are coal-fired units built in 1979. Boilers 3 and 4 are No. 2 oil-fired, International Boiler Works built in 1991. Boilers 16 and 17 are No. 6 oil-fired, Wickes units built in 1945. The station maintains a 30-day supply of fuel oil and a 90-day supply of coal (Breary 1996).

Additional sources of heat at the station include 47 diesel-fired field boilers for remote facilities and structures and the use of heat pumps in the housing areas (Breary 1996).

3.3.6.6 Jet Fuel

Jet fuel is transported to MCAS Cherry Point by rail car from the Beaufort Terminal. From the railhead, the fuel is transported to tank farm B which consists of seven underground storage tanks with a combined capacity of approximately 3 million gallons (11.4 million liters). From tank farm B, the fuel is transported to the three above ground JP-5 tanks at tank farm A, which have a combined storage capacity of approximately 1.62 million gallons (6.1 million liters). Fuel is transported from tank farm A to either the fuel stand or the 27 fuel points along the flight line. The fuel stand is a bulk fuel storage facility used as a collection and distribution point for special fuel requirements not associated with flight line activities. Fuel points 1 through 10 are used for visiting aircraft and EA6 Bravos, 11 through 18 are used for the Harrier Squadrons, and points 19 through 29 are used for cargo planes. Fuel points 4 and 8 do not exist. MCAS Cherry Point maintains a fuel storage capacity of approximately 3.5 million gallons (13.2 million liters) (Lee 1996).

3.3.6.7 Solid Waste Management

MCAS Cherry Point

At MCAS Cherry Point, solid waste is handled by both station personnel and private contractors. Refuse from all sources, except the family housing areas in Hancock Village, Fort Macon, and Slocum Village, is collected by station personnel and hauled to a transfer station at Mockingbird Hill. From the transfer station, private contractors transport the waste to the Tuscarora regional landfill. The family housing areas rely on refuse collection by service contract.

According to landfill disposal data, MCAS Cherry Point generated approximately 13,694 tons (12,431 metric tons) of solid waste in FY 1995. Approximately 5,627 tons (5,108 metric tons) of additional material were recycled yielding a 41% reduction in the solid waste stream, which exceeds the state mandate of a 40% reduction by 2001. Recycling at the station is achieved through a combined effort of the Qualified Recycling Program (QRP) and all routine recycling activities, such as curbside pick-up and drop-off centers. To increase the amount of recycled materials at the station, plans are to construct loading and unloading facilities for mixed paper recycling at the Recycling Center (Cooke 1996).

The station also operates a construction and demolition debris (C&D) landfill. The largest waste, by volume, that the C&D landfill receives are scrap wood, pallets, and shipping containers. Coal ash from the heating plant is also disposed of in the construction debris

landfill. In 1992, the station initiated a waste wood recycling program to limit the amount of wood that is deposited in landfills.

Regional Systems

Craven County is divided into seven franchise areas, each with its own solid waste hauler. All but two municipalities (New Bern and Vanceboro) and MCAS Cherry Point are part of the county's solid waste program. Solid waste in Craven County is disposed of at the Tuscarora regional landfill. Craven County implemented a recycling program in November 1991, which includes curbside pick-up. American Refuse System is the county's sole residential recycling contractor. Since the inception of the recycling program, the county has attained a 45% reduction in the flow of solid waste deposited in landfills (Waters 1996).

The Tuscarora regional landfill is an RCRA Subtitle D landfill. The available capacity of the operating landfill cells is expected to be depleted in early 1998. The design of a new landfill cell is near completion and should be operational by 1998; it is expected to provide an additional 5 years of landfill capacity. Long-term plans for the landfill include the purchase of adjacent property, which is expected to provide landfill capacity for the next 50 years (Dietz 1996).

3.3.7 Transportation

3.3.7.1 Regional Road Network

The primary roadways providing access to MCAS Cherry Point from the surrounding community are U.S. 70 and NC 101. U.S. 70 is a four-lane highway which runs adjacent to the western boundary of the station; it is the major connector between the inland communities such as New Bern and Kinston, and the coastal communities of Morehead City and Emerald Isle. NC 101, a state highway traversing the southern-most end of the station, provides additional access from the coastal cities to the southeast. Figure 3.3-7 displays the regional road network.

3.3.7.2 Station Road Network

A series of on-station roads carries the traffic generated to and from MCAS Cherry Point. Roosevelt Boulevard, the primary arterial road on the base, runs from north to southwest of the runway. The majority of the smaller secondary roads are concentrated in the core area to provide access to the most populated areas of the station.

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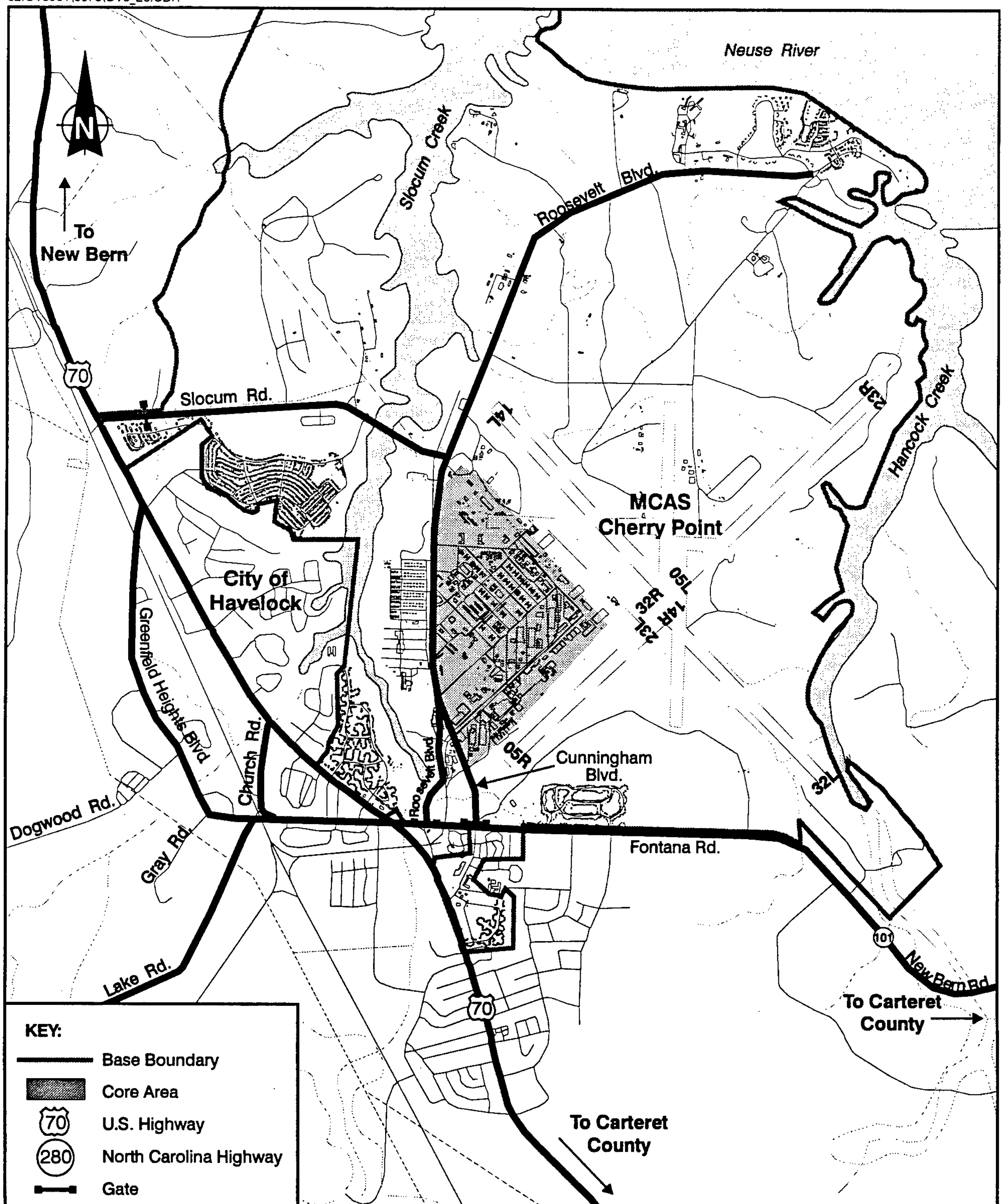

SOURCE: NCDOT 1996

SCALE

0	1,183	2,366 Meters
0	3,881	7,762 Feet

Figure 3.3-7 ROADWAY NETWORK SURROUNDING MCAS CHERRY POINT

There are four access gates servicing the base. The main gate, located at the intersection of NC 101 and Cunningham Boulevard, remains open for a 24-hour period and allows access and egress. The Slocum gate is located to the east of U.S. 70 and is open during periods of higher traffic volumes. Gate 6, located at the intersection of NC 101 and Cunningham Boulevard, is open during peak periods to relieve congestion at the main gate. The Capehart gate is located on Catawba Road, off of U.S. 70 and is open during busy traffic periods.

3.3.7.3 Existing Traffic Conditions

Existing traffic conditions on the roadways surrounding MCAS Cherry Point are acceptable. Using AADT figures from the North Carolina Department of Transportation (NCDOT), various roadway segments in the region perform at an LOS of C or better. During peak periods, traffic volumes may cause a slight degradation in service levels, but these volumes do not significantly impact traffic flow. LOS and AADT volumes for roadways surrounding MCAS Cherry Point are displayed in Table 3.3-12 and illustrated on Figure 3.3-8.

3.3.7.4 Planned Road Improvements

One roadway improvement project planned for the region surrounding MCAS Cherry Point will significantly affect traffic flow. The U.S. 70 Havelock Bypass is currently in the planning stages (TIP B-2123). Preliminary plans are for this road to traverse east of the existing U.S. 70 and Greenfield Heights Road. It would rejoin U.S. 70 just north of the Craven County/Carteret County line. Preliminary plans indicate that this project would begin in the summer of 2001.

3.3.8 Noise

The main source of noise at MCAS Cherry Point is aircraft operations, such as takeoffs, landings, and touch-and-go operations. The last official aircraft noise analysis was conducted in 1986 to establish AICUZ boundaries set forth in a 1988 MCAS Cherry Point Master Plan update (LANTDIV 1988). This study used AAD operations as the basis for the noise analysis because they accurately represented the tempo of airfield operations. A full discussion of relevant noise measurements is presented in Section 3.1.8.

Noise studies are periodically conducted to reassess aircraft noise exposure in the vicinity of the installation. The most recent noise study to assess current noise exposure was

Table 3.3-12

EXISTING TRAFFIC CONDITIONS FOR THE ROADWAYS SURROUNDING MCAS CHERRY POINT

Road	Segment	AADT 1995	LOS
US 70	Greenfield Heights Boulevard to Church Road	19,800	B
US 70	Church Road to Jackson Road	24,600	C
US 70	Jackson Road to NC 101 (Fontana Rd)	35,400	C
US 70	NC 101 (Fontana Rd) to Cunningham Boulevard	32,900	C
US 70	East of Cunningham Boulevard (Carteret County)	20,600	B
NC 101 (Fontana Road)	US 70 to Crocker/Roosevelt Road	18,000	B
NC 101 (Fontana Road)	Crocker/Roosevelt Road to Cunningham Boulevard	9,000	B
NC 101 (Fontana Road)	East of Cunningham Boulevard (Carteret County)	5,900	A

Key:

A = Free-flow conditions.
AADT = Average annual daily traffic.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds; however, low maneuverability.
E = Traffic at capacity of segment. Unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
LOS = Level of service.
NC = North Carolina Route.
US = United States Highway.

Source: NCDOT 1996.

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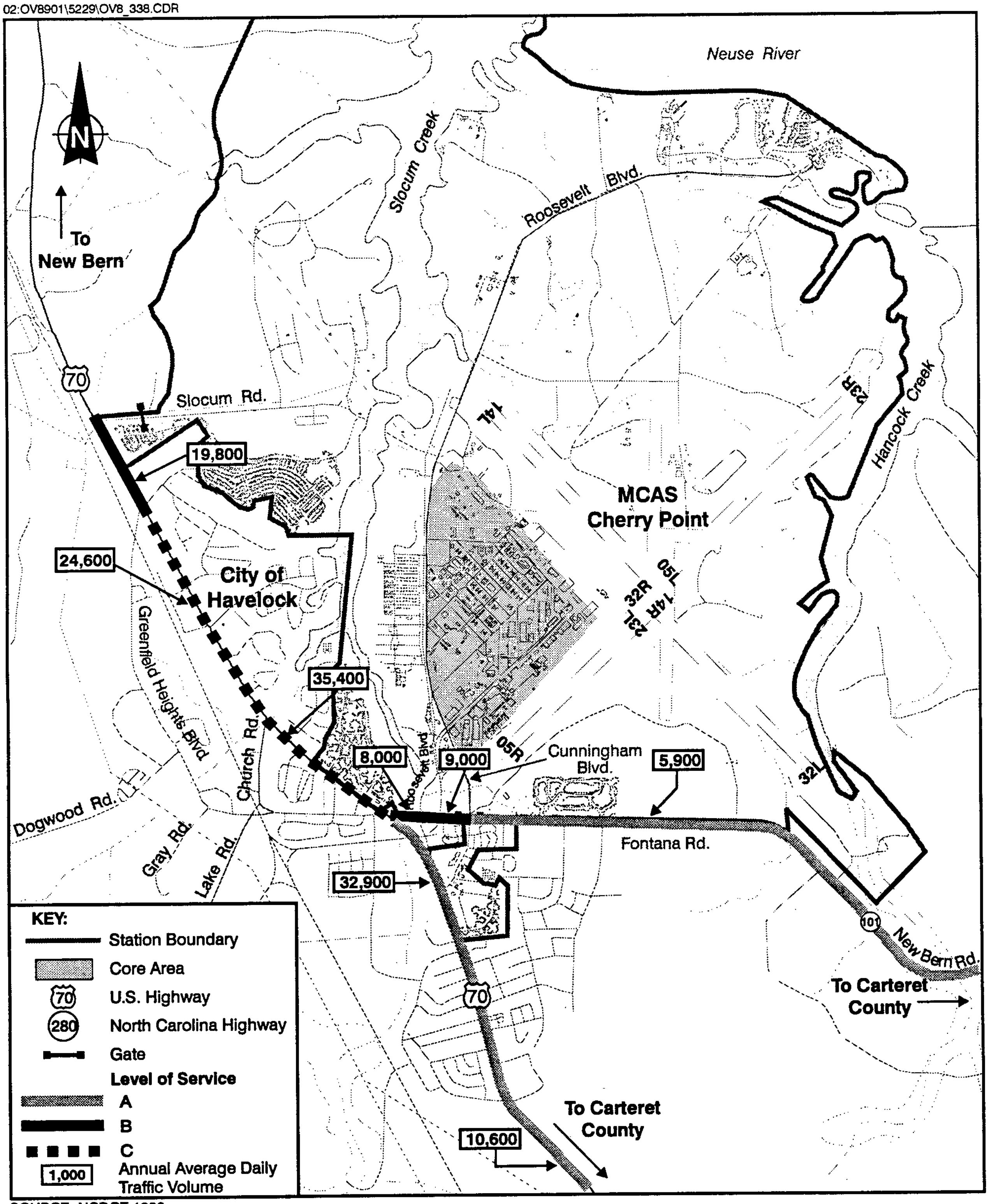


SOURCE: NCDOT 1996

SCALE

0 1,183 2,366 Meters

0 3,881 7,762 Feet

Figure 3.3-8 TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING MCAS CHERRY POINT

conducted in 1997 (Wyle Labs 1997). This study also used AAD operations at MCAS Cherry Point to maintain consistency with the 1988 AICUZ study. A comparison of the existing 1988 AICUZ and 1997 modeled noise contours for MCAS Cherry Point is presented on Figure 3.3-9.

In order to estimate the population within each respective AICUZ and 1997 noise contour, the contours were overlaid on a GIS database containing population data as reported in the *1990 Census of Population and Housing*. Although the population in the four-county area around MCAS Beaufort increased by approximately 6% between 1990 and 1994, the 1990 census has been used for all noise analyses in this DEIS to maintain consistency in population data. Table 3.3-13 presents the total area within each AICUZ contour and the estimated population within the contour.

Table 3.3-13

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1988 AICUZ AND 1997 NOISE CONTOURS MCAS CHERRY POINT

Ldn	1988 AICUZ		1997 Noise Contours	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	5,265 (2,130)	1,529	5,235 (2,119)	1,994
75 dB or greater	321 (130)	29	196 (79)	125
Total	5,586 (2,260)	1,558	5,431 (2,198)	2,119

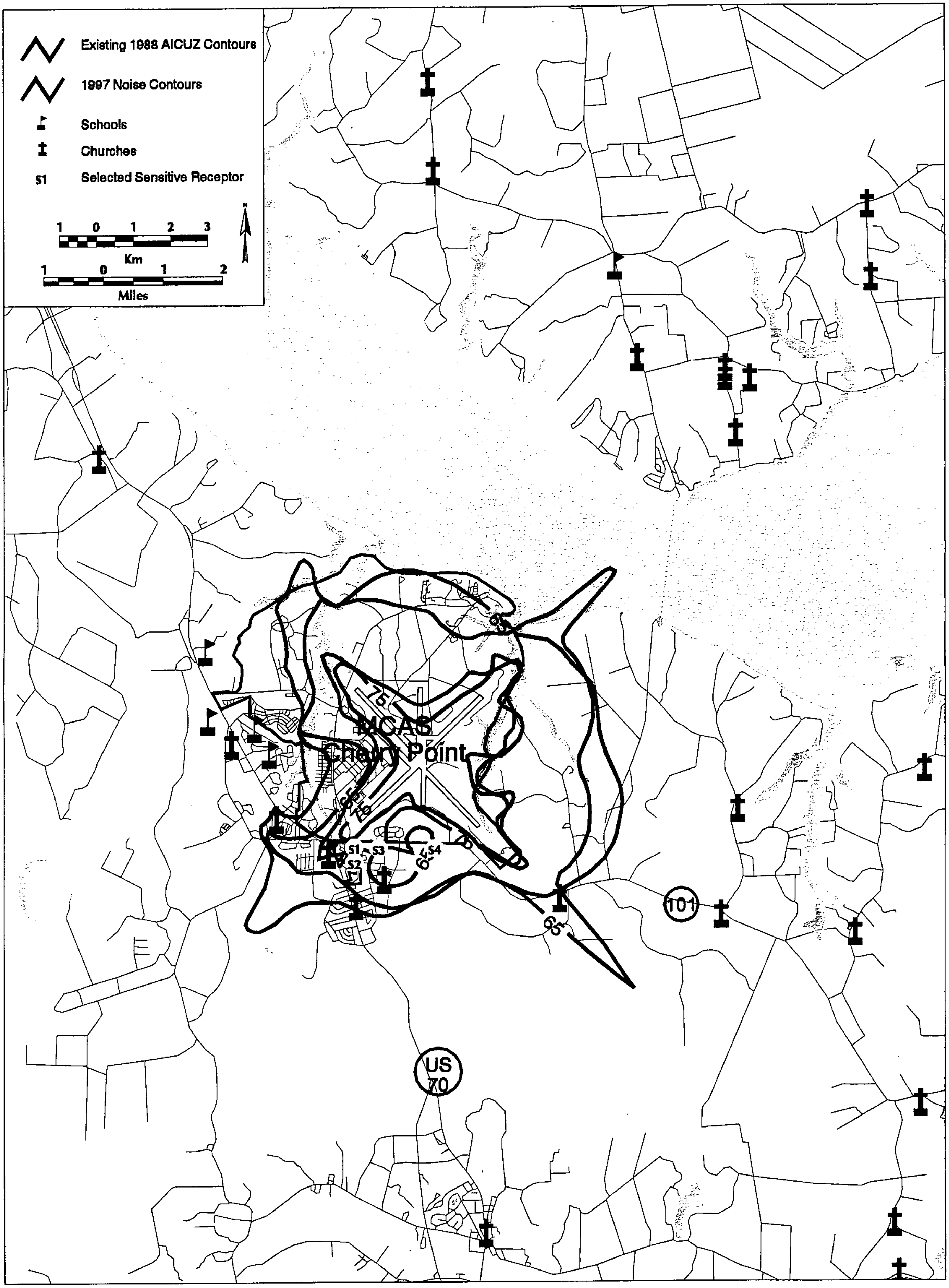
Note: Numbers exclude water areas.

Source: Wyle Labs 1997.

Key:

AICUZ = Air Installation Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

One noise-sensitive receptor (Havelock High, which is indicated as S3 on Table 3.3-14) is located within the 75 dB or greater contour. As part of the 1997 noise assessment, noise levels were calculated for selected schools located near MCAS Cherry Point (see Table 3.3-14). One school is currently under construction and is located near the departure end of Runway 32R.



Source: LANTDIV 1988; Wyle Labs 1997

Figure 3.3-9
AICUZ and 1997 Noise Contours - MCAS Cherry Point

Table 3.3-14

SCHOOLS PROXIMATE TO MCAS CHERRY POINT

Identification Number[a]/Name		1997 Ldn (dB)	1997 Leq (dB)
S1	Havelock Elementary	74	73
S2	Havelock Middle	73	72
S3	Havelock High	76	76
S4	Roger Bell Elementary	66	64

Note: One school located at the departure end of Runway 32R is currently under construction.

[a] Schools are shown on Figure 3.3-9.

Key:

dB = Decibel.
Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

Schools are considered compatible with exterior noise levels between 65 and 75 dB Ldn with incorporation of appropriate sound attenuation. The goal of sound attenuation is an interior environment of 45 dB. Because Ldn includes a penalty for nighttime operations, school-day Leq (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) was calculated to better define existing school conditions. Use of central air conditioning systems in association with closed windows can be expected to reduce noise levels by approximately 25 dB. School sites with an exterior Leq of less than 70 dB would likely experience minimal interference. A site-specific engineering evaluation may be required to adequately evaluate indoor noise levels and the level/type of additional attenuation needed, if any.

3.3.9 Air Quality

3.3.9.1 Air Quality Regulations

MCAS Cherry Point is located in the Southern Coastal Plain air quality-control region which is designated as attainment or unclassified/attainment for all criteria pollutants (40 CFR Part 52).

The federal air quality regulations discussed in Section 3.1.9.1, except for the General Conformity Rule (see Section 3.1.9.2), are applicable to MCAS Cherry Point.

The New Source Review program for new or modified sources and the Title V operating permit program regulate point sources of air pollutants. North Carolina has an approved New Source Review and Title V operating permit program. MCAS Cherry Point has received an operating permit under the State's Title V program.

3.3.9.2 General Conformity

The General Conformity Rule is discussed in Section 3.1.9.2. The provisions of this rule are not applicable to MCAS Cherry Point because the Southern Coastal Plain air quality control region is designated as attainment for all criteria pollutants, and there are no nearby nonattainment areas impacted by emissions from MCAS Cherry Point.

3.3.9.3 Existing Emissions at MCAS Cherry Point

MCAS Cherry Point has both stationary and mobile sources of air pollutants. Stationary sources include: boilers, generators, engine test cells, fuel storage and handling, painting, and parts cleaning. Mobile sources include aircraft flight operations and GSE.

MCAS Cherry Point submitted an initial emission inventory for 1993 as required by NCDEHNR Regulation 2Q.0207. Annual emission reporting is required by NCDEHNR. The latest emission inventory available (1995) was used for this analysis (Radian 1996a).

Emissions from aircraft flight operations are based on flight operations during 1997, the baseline year selected for use in the NASMOD analysis.

Aircraft Emissions

There are six primary aircraft active at MCAS Cherry Point in 1997: the AV-8 Harrier, EA-6B Prowler, KC-130 Hercules, C-141 Starlifter, the E-2 Hawkeye, and various helicopters. The existing annual emissions of criteria pollutants from aircraft are 256 tons of VOCs (as HC), 280 tons of NO_x, 966 tons of CO, 37 tons of SO_2, and 128 tons of PM_{10}. The methods used to estimate aircraft emissions are the same as those used for NAS Oceana, which are discussed in Appendix E. Existing aircraft flight operation data for MCAS Cherry Point were taken from the NASMOD analysis (ATAC 1997).

Stationary Sources

Existing stationary-source emissions were derived directly from the air emissions inventory for MCAS Cherry Point (Radian 1996a). This inventory was performed to satisfy NCDEHNR annual reporting requirements and for MCAS Cherry Point's Title V permit application. Stationary sources at MCAS Cherry Point fall into three main categories: fuel storage and handling; operation of combustion units such as steam and hot water boilers; and maintenance operations on aircraft including out-of-frame engine testing in test cells, auxiliary power unit testing, painting, welding, and parts cleaning. The total existing emissions from stationary sources were 30 tons per year of VOCs, 198 tons per year of NO_x, 64 tons per year of CO, 450 tons per year of SO_2, and 19 tons per year of PM_{10}.

3.3.9.4 Total Existing Emissions

A summary of existing annual emissions from MCAS Cherry Point is presented in Table 3.3-15. Existing annual total emissions are 286 tons of VOCs, 479 tons of NO_x, 1,030 tons of CO, 487 tons of SO_2, and 147 tons of PM_{10}.

Table 3.3-15

EXISTING[a] AIR EMISSIONS SUMMARY FOR MCAS CHERRY POINT (tons per year)

Source Type	VOCs	NO_x	CO	SO_2	PM_{10}
Mobile Sources					
Aircraft[b]	255.9	280.1	965.9	36.6	127.6
GSE	0.06	0.73	0.16	0.05	0.05
Total Mobile	255.96	280.83	966.06	36.65	127.65
Stationary Sources					
Boilers	0.93	190.52	60.11	449.48	11.68
Generators	0.35	4.63	1.26	0.54	0.22
Engine Testing[b]	0.51	3.32	2.14	0.16	3.82
APU Test Cell[b]	0.00	0.02	0.02	0.00	0.00
Fuel Storage and Handling	7.98	0.00	0.00	0.00	0.00
Painting	6.05	0.00	0.00	0.00	0.18
Parts Cleaning	6.70	0.00	0.00	0.00	0.00
Miscellaneous	7.04	0.00	0.07	0.01	3.15
Total Stationary	29.56	198.49	63.6	450.19	19.05
Total	285.52	479.32	1,029.66	486.84	146.70

[a] Aircraft flight operations emissions existing in 1997; stationary source emissions existing in 1995.
[b] Aircraft engine VOC emissions reported under mobile sources and engine testing under stationary sources are nonmethane hydrocarbons.

Key:

CO = Carbon monoxide.
NO_x = Nitrogen oxides.
PM_{10} = Particulate matter.
SO_2 = Sulfur dioxide.
VOCs = Volatile organic compounds.

Sources: Radian 1996a.

3.3.10 Topography, Geology, and Soils

3.3.10.1 Topography

Topography at MCAS Cherry Point is relatively level. Ground elevations range from sea level along the Neuse River, Slocum Creek, and Hancock Creek to almost 30 feet (9.1 meters) above sea level in the area of the station's runways. Some relief occurs around short slopes and the banks of the aforementioned water bodies.

3.3.10.2 Geology

The surficial geology of MCAS Cherry Point was dominated by marine and fluvian-estuarine processes during the middle Pleistocene epoch, which began approximately 500,000 years ago. The Flanner Beach Formation is the surficial deposit, described as sand, silty sand, and clay. Sand, silty sand, and clayey sands, representing the early Pleistocene through early Miocene epochs, are present from depths of 40 to 145 feet (12.2 to 44.2 meters). From 145 feet to 600 feet (44.2 to 182.9 meters), Oligocene and Eocene sediments consist of sand, limestone, and sandy limestone.

3.3.10.3 Soils

The majority of soil types in the core area of the station are classified as Udorthents or fill material. Additional map units at the station include Bragg, Masontown, Norfolk, Goldsboro, Lynchburg, Raines, Kureb, Tarboro, and Suffolk soil types. These soil types generally consist of loamy fine sands, fine sandy loams, or mucky fine sandy loams.

3.3.11 Water Resources

3.3.11.1 Surface Water

MCAS Cherry Point is located within the Neuse River watershed. The Neuse River watershed extends from Persons and Orange counties in north central North Carolina to Pamlico Sound, and consists of approximately 3,300 miles (5,310 km) of rivers and streams.

The station is bordered on three sides by surface water bodies: the Neuse River to the north, Slocum and Tucker creeks to the west, and Hancock Creek to the east. Areas of the station within the 100-year floodplain generally extend inland from these water bodies. No significant areas of the developed portion of the station, including the entire core area, are located within the 100-year floodplain.

Waters of the Neuse River are classified by NCDEHNR as SB estuarine waters, while Hancock, Slocum, and Tucker creeks are classified as SC estuarine waters (NCDEHNR

1996). Additionally, these waters are designated as nutrient-sensitive waters (NSW), in an effort to reduce nitrogen and phosphorous loadings.

A series of studies have been funded by MCAS Cherry Point to examine water quality of major water bodies near the station to determine the impact of past, current, and future wastewater discharges (Fleming and Hightower 1995). Analyses included bottom sediment sampling and analysis, benthic organism surveys, fish population surveys, and tissue analysis in the Neuse River and Slocum and Hancock creeks. These studies indicated that bioaccumulation of contaminants in the food chain was not detectable and that biodiversity in these waters was comparable to adjacent waterbodies (Fleming and Hightower 1995).

3.3.11.2 Groundwater

Groundwater in Craven County, in which MCAS Cherry Point is located, is present near the surface, particularly in winter and late spring. The surficial layer extends down from the water table to a maximum depth of about 60 feet (18.3 meters), although it is somewhat thicker in southern portions of the county (Holland Consulting Planners, Inc. 1995). Below this lies the Yorktown Aquifer, extending to a depth of roughly 100 feet (30.5 meters). A third aquifer, the Castle Hayne formation, extends from approximately 150 to 500 feet (45.7 to 152.4 meters) below ground surface and supplies most of the county's wells, including those at MCAS Cherry Point (Holland Consulting Planners, Inc. 1995).

Groundwater quality at MCAS Cherry Point is generally good. Water is withdrawn from deep wells tapping the lower portion of the Castle Hayne formation. However, water pumped from the station's wells is treated and filtered to remove iron and other precipitates prior to distribution (see Section 3.3.6.1).

3.3.11.3 Wetlands

As part of a basewide inventory, a wetland delineation survey was conducted in 1995 on land areas around the station's existing runway facilities (Geo-Marine 1995a). Three types of wetlands fall within the project area associated with the proposed new runway. In the area of the child development center, there is a forested wetland, north of the proposed site, associated with the tributary to the north branch of Bennett Creek. The center would be sited in uplands.

NWI maps indicate the presence of estuarine and palustrine wetland complexes along Hancock Creek and the minor tributaries that drain to the creek. The Geo-Marine wetland delineation survey identified wetland areas that are considerably more extensive than the NWI maps show, although none of the mapped wetlands had estuarine components. Geo-Marine

identified three wetland habitat types at the station: palustrine forested (PFO), palustrine scrub-shrub (PSS), and palustrine emergent (PEM). In addition, the proposed new runway would impact estuarine areas associated with Hancock Creek and several small tributaries. No in-field delineations have been conducted to determine the presence/absence of wetland communities associated with these estuarine areas.

The NWI maps show these estuarine areas extending up the small tributaries to Hancock Creek. The Geo-Marine delineations indicate that palustrine wetlands are associated with the tributaries. Figure 3.3-10 identifies the extent of the wetlands occurring within the project area at MCAS Cherry Point. Total wetland acreage is 99.4 acres (40.2 hectares). Table 3.3-16 identifies the wetland types and acreages within the area for the proposed new runway. However, nonforested wetlands in the Type II and Type III clear zones would not be disturbed.

Several wetland complexes are mapped as occurring within or adjacent to the proposed paved and airfield clearance zone for the new runway. They include PFO, PSS, and PEM wetlands. Several of the drainage ditches adjacent to the runway were also identified as wetlands during the 1995 delineations. General descriptions of these wetland types are provided below.

Palustrine Forested. The forested wetlands identified by Geo-Marine were associated with the floodplain of Hancock Creek. These wetlands extend from the edge of clearing associated with the existing runway to the creek. Dominant overstory species include red maple (*Acer rubrum*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), sweetgum (*Liquidambar styraciflua*), and swamp tupelo (*Nyssa sylvatica* var. *biflora*). The shrubs include reproduction of the overstory as well as other species including wax myrtle (*Myrica cerifera*), sweet pepperbush (*Clethra alnifolia*), and farkleberry (*Vaccinium arborea*). The understory varies in densities with typical species consisting of giant cane (*Arundinaria gigantea*), cinnamon fern (*Osmunda cinnamomea*), and Virginia creeper (*Parthenocissus quinquefolia*).

Palustrine Shrub-Scrub. Much of the PSS wetland occurring at MCAS Cherry Point results from clearing of forested vegetation within the clear zones of the runway or shrub growth within the drainage ditches on base. The PSS communities are likely transitional following disturbance. These wetlands typically were dominated by reproduction of species found in the forested wetlands. Black willow (*Salix nigra*) was also identified as a common

Table 3.3-16

WETLANDS WITHIN THE PROPOSED NEW RUNWAY AREA AT MCAS CHERRY POINT[a]

Wetland	Cowardin Classification	Area[b] (acres)	Comment
1	PEM	1.89	Type II and III clear zones
2	PFO/PSS	3.11	Primary surface
3	PEM	8.31	Primary surface
4	PFO/PSS	7.19	Primary surface
5	PEM	1.46	Primary surface
6	PFO	6.60	Primary surface
7	PEM	5.57	Primary surface
8	Estuarine[c]	2.22	Primary surface; tributary to Hancock Creek
9	PFO	2.12	Primary surface
10	Estuarine	0.29	Primary surface; tributary to Hancock Creek
11	PEM	2.20	Type I and III clear zones
12	PFO	3.57	Type I and II clear zones
13	PFO	1.44	Type II clear zone
14	PFO	2.60	Type II and III clear zones
15	PFO	2.75	Type III clear zone
16	Estuarine	48.08	Type I, II, and III clear zones
TOTAL		99.4	

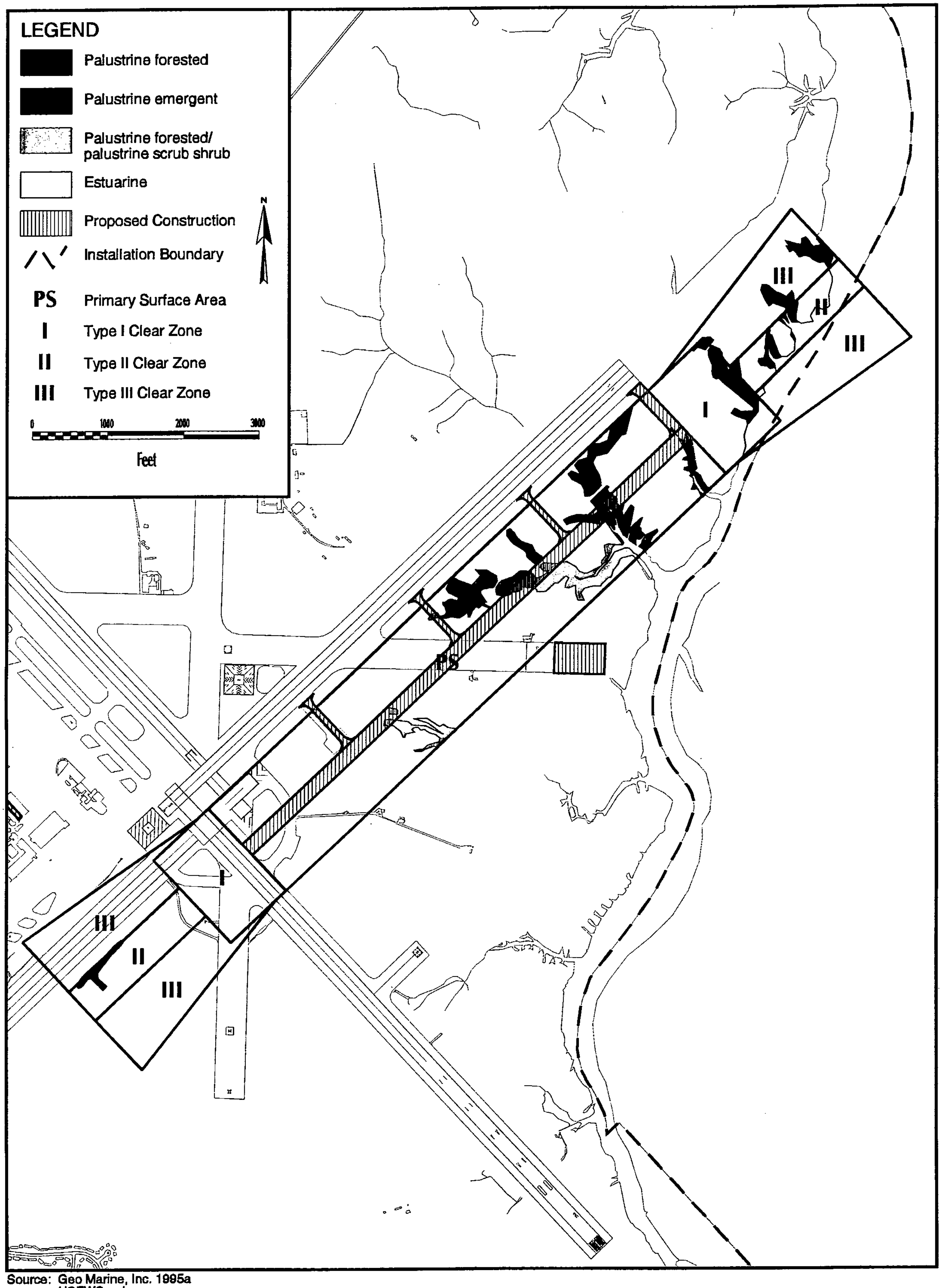
a New runway includes aboveground level areas and clear zones; however, nonforested wetlands in the clear zone will not be disturbed.

b Wetland acreage only reflects totals within the runway and clear zone footprints.

c Estuarine areas are inclusive of Hancock Creek and tributaries. No in-field delineations have been conducted to determine the presence/absence of wetland communities along the fringes of the estuarine zone.

Key:

PEM = Palustrine emergent.
PFO = Palustrine forested.
PSS = Palustrine scrub-shrub.



Source: Geo Marine, Inc. 1995a
USFWS n.d.

Figure 3.3-10
Wetlands Within Proposed Development Areas at MCAS Cherry Point

associate. Because of the increased sunlight in the herbaceous layer, cattail (*Typha latifolia*) was identified as a common associate in this stratum.

Palustrine Emergent. PEM wetlands in the project area are primarily restricted to drainage ditches and swales. Typical vegetation includes vasey grass (*Paspalum urvillei*), knotroot bristle grass (*Setaria geniculata*), cattail, and coinwort (*Centella asiatica*).

3.3.12 Terrestrial Environment

3.3.12.1 Vegetation

MCAS Cherry Point is located in the Coastal Plain physiographic province of North Carolina, which comprises nearly half of the state. This province is characterized by such natural communities as swamp forest, oak-hickory forest, pine flatwoods and pocosin (Clay 1975). Approximately 55% of the land area on station is forested, dominated primarily by loblolly pine stands. Timber management practices such as thinning, planting, and prescribed burning are conducted to maintain and enhance these resources. Other natural communities at the station include mesic mixed hardwood forests, coastal fringe evergreen forests, coastal plain small stream swamp, and tidal freshwater marsh (LeBlond et al. 1994).

Most of the proposed project areas at the station are within the core area. Vegetation in these areas is limited to those typical of urban environments, consisting of a variety of maintained planted grasses and ornamental shrubs and trees near buildings and sidewalks. Project areas for the proposed parallel runway and child development center are described below.

Parallel Runway

The proposed parallel runway is located adjacent to the eastern edge of existing Runway 23R and is aligned southwest to northeast. Vegetation in the area of the proposed runway is characterized as a mixture of maintained clear zone, pine-hardwood forest stands, planted pine, and palustrine wetlands. In addition, a portion of the clear zone for the runway would extend to Hancock Creek. Toward the core area, the majority of the runway area is military-urban complex, with vegetation mowed or maintained in a shrubby condition for existing operations. Toward the northeastern end of the runway, along Hancock Creek, the dominant vegetation is pine-hardwood forest, along with a small pine stand located toward the end of the runway. These forest communities are typically dominated by loblolly pine and a

variety of oak (*Quercus* spp.) (U.S. Marine Corps 1980). The pure pine stands include shortleaf and loblolly pine.

Child Development Center

The area proposed for the child development center is predominantly military urban with some mixed pine hardwood or upland hardwood.

3.3.12.2 Wildlife

Forested areas at MCAS Cherry Point support a wide variety of wildlife. Depending on the natural community, these areas support mammal species such as whitetail deer, gray fox, river otter, beaver, raccoon, opossum, and eastern cottontail. Other mammals such as black bear, red fox, and bobcat are present, but occur less frequently. Bird species include a variety of songbirds, woodpeckers, and raptors.

Developed portions of the station provide limited habitat for species tolerant of urban environments, including various songbirds, mourning dove, gray squirrel, and some racoon and opossum.

3.3.12.3 Threatened and Endangered Species

An inventory of rare species, natural communities, and critical areas at MCAS Cherry Point was completed in 1994 (LeBlond et al. 1994). The survey indicated that four species listed as threatened or endangered by the USFWS or the State of North Carolina could be present in the vicinity of the proposed project locations at MCAS Cherry Point. The federally-threatened American alligator is associated with Hancock and Slocum creeks and their larger tributaries. The entire Hancock Creek drainage in the vicinity of the base is identified as a critical area because of the occurrence of the alligator (LeBlond et al. 1994). The bald eagle, currently listed as threatened by the USFWS, occurs at the station on an infrequent basis. Finally, spring goldenrod, a state-listed endangered plant species, occurs at several locations at the station (LeBlond et al. 1994).

The proposed parallel runway would traverse several small backwater tributaries to Hancock Creek. Additionally, portions of the clear zones to the northeast of the runway would intersect the creek.

Spring goldenrod and Chapman's sedge (*Carex chapmanii*) are reported in the vicinity of the proposed child development center. The goldenrod occurs south of the site in wet pine flatwoods. The sedge is found north of the site in a nontidal floodplain.

3.3.13 Cultural Resources

3.3.13.1 Archaeological Resources

Prehistoric cultural occupation of the North Carolina coastal plain has been found to parallel, in broad terms, the major prehistoric cultural divisions identified all along the eastern United States. These periods, differentiated by settlement patterns, subsistence strategies and inventories of cultural items, include: the Paleo-Indian (12,000 to 8,000 B.C.); the Archaic (8,000 to 1,000 B.C.) and the Woodland (1,000 B.C. to European settlement of the late 17th through early 18th centuries) (Hargrove et al. 1984). Subperiods, such as early, middle, or late, further divide the Archaic and Woodland periods into smaller cultural units.

Native groups along the North Carolina coast were displaced early during the European settlement period, possibly accelerated by pressures from other displaced groups to the north intruding on them. By the end of the Tuscarora War (1715 to 1718), local native populations had largely disappeared or had been absorbed by other groups to the west.

European settlement of coastal North Carolina began in the 1650s in the Abermarle Sound area, and by 1703 had reached the Neuse River near the present site of MCAS Cherry Point. Land grants to William Handcock in 1707 included more than 1,300 acres along the Hancock Creek. Craven County was formed in 1712; Carteret County was formed the following year. Up to the Civil War, the economy of the region centered on farming and livestock, supplemented with limited production and sale of maritime supplies. Following the Civil War, lumber became the prominent industry through the 20th century (Hargrove et al. 1984).

The military history of the station dates to 1941, when Cherry Point was selected as a site for a Marine Corps Air Station. Construction of the station began in August of 1941, and included the initial development of 1,800 buildings, 650 acres of paved areas, and the moving of more than 10 million cubic yards of earth (Hargrove et al. 1984; R. Christopher Goodwin and Associates 1996).

Previous archaeological surveys at the station included Phase I identification surveys in 1984 and 1996, which included: identification of disturbed and undisturbed areas of the station; the development of a predictive model for prehistoric sites that identified high- and low-probability areas for occurrences of intact resources; and a 25% sample of undisturbed portions of the station (Hargrove et al. 1984). This survey documented that approximately 52% of the station (approximately 6,100 acres [2,469 hectares]) has been significantly disturbed by past activities and is unlikely to contain intact archaeological resources. These disturbed areas include the entire core area of the station and areas containing the station's

runways and family housing areas, as well as isolated locations in the northern portion of the station (Hargrove et al. 1984; R. Christopher Goodwin and Associates 1996).

The majority of the proposed development is slated to occur in this disturbed area. Specifically, Structures 1660 (antennae), 4149 (radar antennae), 4151 (van pad), and 1645 (air surveillance generator) would be relocated into this area of prior disturbance. Similarly, the construction of the new apron and blast plates would occur in previously graded and currently paved areas next to the existing runway. The construction of the new clinic, flight simulator, and the AIMD facility would occur on both sides of 5th Avenue at the heart of the developed section of the facility; these locations previously contained demolished Buildings 201 and 202 and a parking area.

The proposed construction of the child development center would be located outside the highly developed portion of MCAS Cherry Point. However, this location formerly contained a temporary service building, which has been demolished. Other localized disturbance at the location of the proposed child development center include a paved road and a macadam parking area. This project area was surveyed by 89 subsurface shovel tests, which failed to produce any artifacts or evidence of historic/prehistoric occupation (R. Christopher Goodwin and Associates 1996).

Two proposed projects would be constructed in areas that have not been previously surveyed. A facility relocation project (i.e., relocation of the engine test cell [Structure Nos. 4044, 4043, 4042]) would be constructed southeast of Runway 23. This project would involve construction of new pads. Additionally, a new 8,000-foot parallel runway is proposed for construction to the east of the existing Runway 23.

The areas of the proposed facility relocation and parallel runway may have undergone extensive surface disturbance during prior construction (Hargrove et al. 1984). However, this location lies outside of the highly developed core area of MCAS Cherry Point. It corresponds to an inland/riverine topographic setting that has been demonstrated to contain archaeological sites (R. Christopher Goodwin and Associates 1996). Intact archaeological resources may be extant in these two locations.

3.3.13.2 Architectural Resources

Previous studies of architectural resources at MCAS Cherry Point included a survey conducted by John Milner Associates of selected buildings that could have been affected by construction associated with realignment to the station under the 1993 BRAC mandates (John Milner Associates 1994) and a 1996 investigation conducted by R. Christopher Goodwin and Associates of 970 buildings/structures (R. Christopher Goodwin and Associates 1996). The

Milner survey included two buildings that would potentially be affected by the proposed action (i.e., Buildings 130 and 131). The Goodwin survey reassessed these resources after defining two appropriate historic contexts for their evaluation, including the World War II period (1941 to 1945) and the Cold War Period (1946 to 1957).

The Milner study recommended further investigation of Buildings 130 and 131 to determine their eligibility for NRHP. The North Carolina Department of Cultural Resources (i.e., the North Carolina SHPO) concurred and recommended that these buildings be considered NRHP-eligible until appropriate historic contexts and comparative studies allow full evaluation.

The Goodwin study, after defining the appropriate historic contexts, concluded that these resources were not unique examples of World War II or Cold War military architecture, given modifications that had been made to their original design (R. Christopher Goodwin and Associates 1996). Better examples of these building types were encountered at other installations. Therefore, Goodwin recommended that these buildings not be considered NRHP-eligible. These recommendations and conclusions are currently being reviewed by the North Carolina Department of Cultural Resources.

Additional buildings (Buildings 1665, 1700, 4041, and 4045) that would be demolished as part of the proposed action are less than 50 years old and do not possess qualities of exceptional significance under the Secretary of the Interior's Criteria for Evaluations (36 CFR 60.4).

3.3.14 Environmental Contamination

3.3.14.1 Hazardous Materials and Waste Management

A variety of hazardous materials are used at MCAS Cherry Point including petroleum, oils and lubricants (POLs); solvents and thinners; caustic cleaning compounds and surfactants; cooling fluids (antifreeze); adhesives; acids and corrosives; paints; and herbicides, pesticides and fungicides (Gannett Fleming, Inc. 1993).

Principal users of hazardous materials and generators of hazardous waste are the aircraft and vehicle repair and maintenance divisions of the MCAS Cherry Point and its tenants, including the NADEP and the 2nd Marine Aircraft Wing (MAW). Hazardous waste-generating activities include painting, solvent cleaning and degreasing, mechanical and chemical paint and rust removal, fluids changeout, electroplating, metal casting, machining, and welding/soldering.

MCAS Cherry Point is a large quantity generator of hazardous waste, as defined by the Resource Conservation and Recovery Act (RCRA). In 1995, approximately 3.6 million

pounds (lbs) (1.62 million kilograms) of hazardous waste were generated and managed in compliance with a RCRA Part B permit issued by the EPA and the State of North Carolina in 1992 (Nelson 1996). The quantity of hazardous waste generated by the activities and commands at MCAS Cherry Point is shown on Table 3.3-17.

Table 3.3-17

HAZARDOUS WASTE GENERATION AT MCAS CHERRY POINT - 1995

Command/Tenant	Quantity (lbs.)
Naval Aviation Depot	2,364,054
MCAS Cherry Point (Station)	1,200,303a
2nd Marine Aircraft Wing	90,514
2nd Force Services Support Group	4,157
Naval Hospital	1,490
TOTAL	**3,660,518**

[a] Total includes 1,061,200 lbs. of demolition debris.

Sources: Nelson 1996; Miller n.d.

All hazardous material is received through the Defense Distribution Depot, where shipments are inspected for proper labelling and documentation. Materials are supplied to the operational units at the base. Appropriate Material Safety Data Sheets are located on a computerized database and are also maintained by the Occupational Health Clinic and the Environmental Affairs Department. Excess hazardous material is turned in to the Hazardous Material Control Center, where it is screened for use by another operating unit.

Satellite accumulation areas for hazardous waste are located in proximity to hazardous waste generators throughout the base. In 1995, MCAS Cherry Point maintained 40 to 50 satellite accumulation areas (Smith, A. 1996). When a quantity of 55 gallons (208.5 liters) is collected at the satellite accumulation area, it is transported to a 90-day accumulation area or permitted storage facility. On base are 33 accumulation areas, and two permitted hazardous waste storage facilities (Smith, A. 1996). The Defense Reutilization and Marketing Office (DRMO) maintains the main hazardous waste storage area and is responsible for contracting off-site disposal of hazardous waste. The Facilities Maintenance Department also has a hazardous waste storage lot, that is covered in the RCRA Part B permit.

The NADEP maintains approximately 175 satellite accumulation areas, and twenty-seven 90-day accumulation areas (Miller 1996). It also transfers the waste for off-site disposal to the DRMO hazardous waste storage area.

Several of the accumulation areas have been investigated for suspected site contamination, including the Marine Wing Communications Squadron 28 Accumulation Area, the Marine Aerial Refueler Transport 252 Accumulation Area, the Crash Crew Accumulation Area, and the Marine Aircraft Group (MAG) 14 Accumulation Area. Interim corrective measures were implemented in 1993, and a closure report is pending (Brown & Root Environmental 1996b).

Both the DRMO hazardous waste storage area and the Facilities Maintenance Department hazardous waste storage lot have undergone investigation for suspected site contamination. The Facilities Maintenance storage area requires closure due to soil contamination (Brown & Root Environmental 1996b). Some soil removal has been conducted at the DRMO hazardous waste storage lot, and MCAS Cherry Point is investigating a potential site for relocation of this facility (Smith, A. 1996).

3.3.14.2 Installation Restoration Program Sites

Hazardous waste disposal sites at MCAS Cherry Point are investigated under the DoD's Installation Restoration Program (IRP), in compliance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for former waste sites and RCRA for sites associated with ongoing operations.

An Initial Assessment Study of former waste disposal sites was completed in 1983, and fourteen CERCLA sites were identified for further action (Water and Air Research, Inc. 1983). In 1984, Congress enacted the Hazardous and Solid Waste Amendments (HSWA) to RCRA, addressing the need for corrective action at sites where solid and hazardous waste operations were still active. Under this authority, EPA conducted a RCRA Facility Assessment at MCAS Cherry Point in 1988 and identified 114 solid waste management units (SWMUs) and 2 other areas of concern (AOCs).

In 1989, the Navy entered into a RCRA Administrative Order of Consent with EPA to investigate 32 of the 114 identified SWMUs, which included all of the sites that were previously investigated as CERCLA sites. However, the EPA also scored the sites at MCAS Cherry Point on a national Hazard Ranking System, and subsequently listed the base on its National Priorities List (NPL) of hazardous waste sites. Because of the listing, the IRP investigations are being conducted consistent with the requirements of both RCRA and CERCLA (Brown and Root Environmental 1996b).

The Navy combined the 32 SWMUs into 12 operable units (OU), to facilitate the investigations and selections of remedial actions. Projects associated with the proposed action would be located in OU-1, OU-6, and OU-10 (see Figure 3.3-11). Included in OU-1 are seven sites: the area and ditch behind NADEP (Site 15); the landfill at Sandy Branch (Site 16); the NADEP former drum storage area (Site 40); the industrial wastewater treatment plant (IWTP) (Site 42); the industrial sewer system (Site 47); the Building 137 plating shop (Site 51); and the Building 133 plating shop and ditch (Site 52). Fourteen additional sites are located within the boundaries of OU-1. However, they are defined as part of other OU Preliminary Assessment/Site Investigation Sites, SWMUs or underground storage tanks (USTs).

In 1996, the Navy completed a focused remedial investigation/feasibility study (RI/FS) to address primary groundwater contamination at OU-1, and prevent contaminant migration from the surficial aquifer to underlying aquifers and to Sandy Branch, the down-gradient surface water body. A comprehensive RI/FS, including risk assessment, will be prepared at a later date to address all OU-1 contaminated groundwater, as well as other OU-1 contaminated media (Brown & Root Environmental 1996a).

OU-6 contains only Site 12, a crash crew training area, and an oil/water separator. RCRA facility investigation (RFI) activities including well installation and soil and groundwater sample collection have been conducted. Additional sample collection programs will be conducted as part of the RI/RFI (Brown & Root Environmental 1997).

OU-10 consists of three waste accumulation areas containing wastes similar to those detected in shallow soil samples. The sites include the VMGR (Site 33), crash crew (Site 34), and Marine Aircraft Group (MAG) 14. An interim remedial measure (IRM) consisting of soil removal was conducted in 1993.

The MAG 14 area is located northeast of Runway 28. Confirmation soil and groundwater samples were collected at this site after the IRM was completed. No further action was recommended (Brown & Root Environmental 1997).

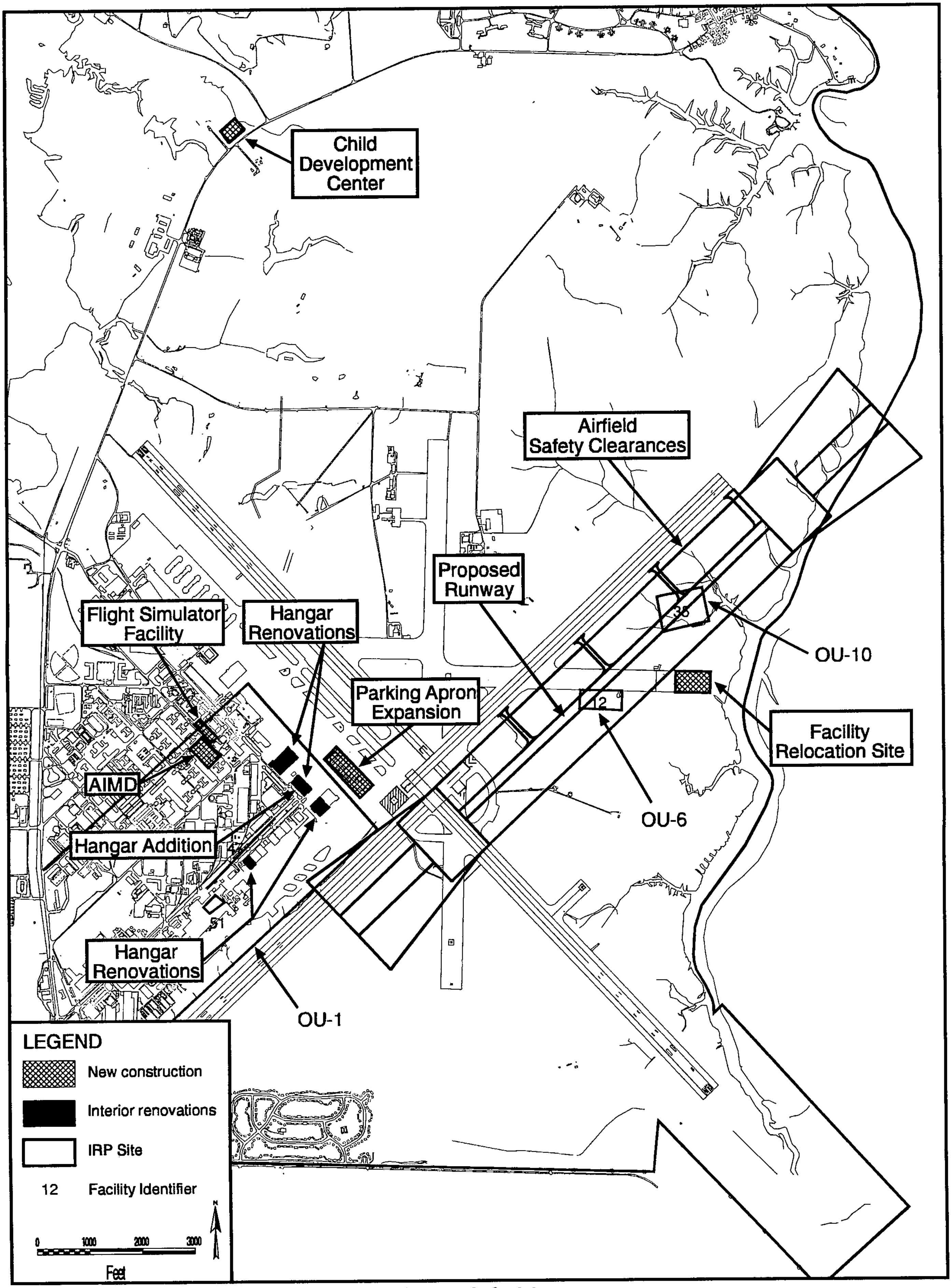


Figure 3.3-11
Installation Restoration Program Sites Near Proposed Construction Sites - MCAS Cherry Point

4 Environmental Consequences and Mitigation Measures: Alternative Realignment Scenario 1

ARS 1 would involve realigning all 11 F/A-18 fleet squadrons and F/A-18 FRS from NAS Cecil Field to NAS Oceana. This section discusses the potential environmental impacts of this ARS at NAS Oceana and associated ranges and airspace. All impacts discussed are projected to occur by 1999, when realignment from NAS Cecil Field would be completed. Where appropriate, mitigation measures are discussed to avoid or lessen the severity of projected impacts.

4.1 Airfield Operations

In order to determine the effect that the proposed realignment would have on future airfield operations at NAS Oceana and NALF Fentress, the projected operations were calculated using the Naval Aviation Simulation Model (NASMOD). This computer-based model provides the Navy with the capability to:

- Quantitatively assess airfield and airspace capacity in support of proposed operational alternatives;
- Calculate the impacts of changes in special use airspace on both military and civilian operations;
- Analyze the operational impacts of interaction between military and civilian aircraft; and
- Analyze pilot training system resource requirements including airfields, airspace, instructors, syllabus, aircraft type, maintenance, fuel and operating costs.

NASMOD merges the capabilities of the Federal Aviation Administration's (FAA's) Simulation Model (SIMMOD) with enhancements to the Naval Aviation Training System (NATS) model developed in 1986. SIMMOD, an advanced state-of-the-art model that simulates both airfield and airspace traffic operations, has been used extensively by the FAA in studies and analyses aimed at planning for operational changes in the National Airspace System. The model has proven to be extremely valuable as a tool for analyzing airport and airspace problems, identifying potential solutions, and quantitatively assessing the delay, capacity, traffic loading, and operating costs impacts of potential operational alternatives. A complete discussion of NASMOD is provided in Appendix C. A one duty runway plan (Runways 5 R/L) was used for modeling purposes (ATAC 1997). This modeling approach was supported by the following NAS Oceana airfield characteristics:

- Approximately 75% of air operations are conducted via Runway 5;
- There is no significant difference between the duty runways with regard to the total time required by aircraft to taxi for takeoff and return to aircraft parking areas after landing; and there is somewhat less room for aircraft holding for departures on Runway 32;
- The overhead break, visual, and instrument approaches are available to all four runway pairs. Standard departures can be made from all of the runways;

- Each of the runway pairs has a visual pattern and a Ground Control Approach (GCA) box pattern. The capacities of the patterns are the same for each runway pair; and

- Field Carrier Landing Practice (FCLPs) can be performed on any of the runways.

It should be noted that one runway was used for airfield modeling solely to determine changes in airfield capacity. For the aircraft noise analysis discussed in Section 4.8, projected air traffic was distributed to both sets of runways.

The aircraft operations performed at NAS Oceana result primarily from squadrons based at NAS Oceana as opposed to those generated by transient aircraft (aircraft not based at NAS Oceana that arrive or depart from the station). To determine the demand of these two types of users, two primary sources of data were utilized. These data were collected during visits and subsequent discussions with NAS Oceana and FACSFAC VACAPES personnel (ATAC 1997). For aircraft based at NAS Oceana (and at NAS Norfolk for FCLP operations at NALF Fentress), station personnel were interviewed to identify pertinent aspects of aircraft operations, including training requirements, operating procedures, and detailed aircraft mission profiles.

For transient aircraft, historic airspace operations records were reviewed to determine estimated levels of operation for two types of transient aircraft: jets and props. Transient jets were assumed to be primarily S-3 aircraft, but could include other military jet aircraft. Transient prop aircraft were assumed to be primarily C-12 aircraft, but could also include other military propeller-driven aircraft.

Table 4.1-1 presents projected basic aircraft operations at NAS Oceana and NALF Fentress under ARS 1. Total operations at NAS Oceana would be more than double projected 1997 levels, growing from 109,000 to 237,000. At NALF Fentress projected operations would also increase from current levels, growing from 105,000 to 158,000. This would represent a 51% increase over projected 1997 levels.

Based upon the training requirements used in the NASMOD study, F/A-18 aircraft that would be realigned to the station under ARS 1 could complete their required number of aircraft operations without significantly affecting airfield operations at NAS Oceana or NALF Fentress. Problems such as unusually long taxi times, fuel pit delays, or denial of access to certain patterns around each facility would not occur (ATAC 1997).

Table 4.1-1

1999 PROJECTED BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 1

Aircraft Category	Operation Type	1997 Total Operations[a]	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
F-14 Fleet	Departure	13,225	12,181	1,169	13,350	
	Full Stop Visual Landing	12,700	11,302	1,502	12,804	
	Full Stop Instrument Landing	514	365	171	536	
	Visual Touch-and-Go/Low Approach	20,396	20,772	994	21,766	
	Instrument Touch-and-Go/Low Approach	570	456	56	512	
	Field Carrier Landing Practice	0	640	240	880	
	TOTAL	**47,405**	**45,716**	**4,132**	**49,848**	
F-14 FRS	Departure	6,947	6,539	425	6,964	
	Full Stop Visual Landing	6,308	5,921	393	6,314	
	Full Stop Instrument Landing	639	265	385	650	
	Visual Touch-and-Go/Low Approach	27,456	25,274	918	26,192	
	Instrument Touch-and-Go/Low Approach	5,234	3,732	1,500	5,232	
	Field Carrier Landing Practice	0	0	180	180	
	TOTAL	**46,584**	**41,731**	**3,801**	**45,532**	
F/A-18 Fleet	Departure	0	14,330	1,298	15,628	
	Full Stop Visual Landing	0	12,556	1,891	14,447	
	Full Stop Instrument Landing	0	851	342	1,193	
	Visual Touch-and-Go/Low Approach	0	24,342	1,914	26,256	
	Instrument Touch-and-Go/Low Approach	0	2,124	800	2,924	
	Field Carrier Landing Practice	0	1,180	1,080	2,260	
	TOTAL	**0**	**55,383**	**7,325**	**62,708**	

Table 4.1-1

1999 PROJECTED BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 1

Aircraft Category	Operation Type	1997 Total Operations[a]	Projected 1999 Airfield Operations Day 0700-2200	Night 2200-0700	Total	Percent Change
F/A-18 FRS	Departure	0	8,059	479	8,538	
	Full Stop Visual Landing	0	6,838	667	7,505	
	Full Stop Instrument Landing	0	689	344	1,033	
	Visual Touch-and-Go/Low Approach	0	35,822	2,412	38,234	
	Instrument Touch-and-Go/Low Approach	0	4,406	654	5,060	
	Field Carrier Landing Practice	0	160	0	160	
	TOTAL	**0**	**55,974**	**4,556**	**60,530**	
Adversary	Departure	839	2,262	71	2,333	
	Full Stop Visual Landing	828	2,316	0	2,316	
	Full Stop Instrument Landing	5	16	1	17	
	Visual Touch-and-Go/Low Approach	436	1,476	0	1,476	
	Instrument Touch-and-Go/Low Approach	168	166	0	166	
	TOTAL	**2,276**	**6,236**	**72**	**6,308**	
Transient Jet	Departure	967	947	20	967	
	Full Stop Visual Landing	724	709	14	723	
	Full Stop Instrument Landing	243	242	2	244	
	Visual Touch-and-Go/Low Approach	1,078	1,004	22	1,026	
	Instrument Touch-and-Go/Low Approach	836	804	30	834	
	TOTAL	**3,848**	**3,706**	**88**	**3,794**	
Transient Prop	Departure	1,642	1,634	30	1,664	
	Full Stop Visual Landing	1,171	1,173	16	1,189	

Table 4.1-1

1999 PROJECTED BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 1

Aircraft Category	Operation Type	1997 Total Operations[a]	Projected 1999 Airfield Operations Day 0700-2200	Night 2200-0700	Total	Percent Change
	Full Stop Instrument Landing	471	467	8	475	
	Visual Touch-and-Go/Low Approach	2,890	2,778	52	2,830	
	Instrument Touch-and-Go/Low Approach	2,610	2,572	42	2,614	
	TOTAL	8,784	8,624	148	8,772	
	AIRFIELD TOTAL	108,897	217,370	20,122	237,492	118
NALF Fentress						
F-14 Fleet	Field Carrier Landing Practice	38,640	22,240	15,920	38,160	
F-14 FRS	Field Carrier Landing Practice	23,280	16,170	7,290	23,460	
F/A-18 Fleet	Field Carrier Landing Practice	0	18,780	10,560	29,340	
F/A-18 FRS	Field Carrier Landing Practice	0	18,166	6,320	24,486	
E-2 Fleet	Departure	168	94	74	168	
	Full Stop Visual Landing	168	94	74	168	
	Field Carrier Landing Practice	16,464	9,212	7,252	16,464	
E-2 FRS	Departure	616	476	140	616	
	Full Stop Visual Landing	616	476	140	616	
	Field Carrier Landing Practice	16,368	12,648	3,720	16,368	
C-2 Fleet	Departure	112	108	4	112	
	Full Stop Visual Landing	112	108	4	112	
	Field Carrier Landing Practice	8,124	7,908	216	8,124	
	AIRFIELD TOTAL	104,668	106,480	51,714	158,194	51

[a]Based on projections.
Source: ATAC 1997.

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4.2 Military Training Areas

Implementing ARS 1 would not result in the establishment of any new military training areas; F/A-18 aircraft realigned from NAS Cecil Field would use existing MTRs, warning areas and MOAs. However, it would result in changes to the level of aircraft operations in existing military training areas used by these aircraft. This section describes the effects of these changes and includes assessments of the following:

- Whether the projected levels of operations could be readily accommodated into the existing airspace structure; and
- Noise exposure levels resulting from projected aircraft operations.

Projections of annual aircraft operations in various military training areas were derived from the NASMOD analysis (ATAC 1997) (see Appendix C). For exclusive-use training areas (e.g., TACTS range, BT-9, BT-11), the projected levels of utilization were determined by first calculating the maximum number of missions that could be accommodated in each area. This information was obtained from published data on operating times as discussed in Section 3.1.2. The following formula was then used to calculate the projected percent utilization of each range (ATAC 1997):

$$\textit{Percent Utilization} = \frac{(\textit{projected hours}) + (\textit{short-notice canceled hours})}{(\textit{published hours})}$$

Where:

projected hours	=	projected schedule block hours actually flown.
short-notice canceled hours	=	projected schedule block hours canceled without sufficient notice to allow another user to take advantage of available hours.
published hours	=	the official operating times for the area as specified by the area manager.

Projected aircraft operations under the proposed action were used to calculate noise exposure levels in each of the areas, with the exception of off-shore warning areas and MOAs, which primarily involve high-altitude operations such as air-to-air combat training (Wyle Labs 1997). As with existing noise levels discussed in Section 3.1.2, projected sound levels were calculated using the MR_NMAP computer modeling program, and are expressed in maximum Ldnmr (Wyle Labs 1997). As discussed in Section 3.1.2, Ldnmr expressed in

dB is a composite metric that represents average monthly noise levels, with adjustments to account for the "startle" effect of intermittent high-speed aircraft operations.

4.2.1 Military Training Routes (MTRs)

The projected increase in the noise levels and number of sorties for affected MTRs compared to existing operations is presented in Table 4.2-1. Operations along MTRs are projected to increase by approximately 11%, growing from 7,840 to 8,688 total operations. Increases in the level of MTR sorties by Navy F/A-18 and F-14 aircraft vary according to route. Flight operations for MTRs are conducted over a range of altitudes, depending on aircraft type, available capacity, and training mission. However, overall, these additional operations would not significantly affect the ability to schedule and utilize any of the routes.

For comparative purposes, projected sound levels and noise levels for existing operations are expressed in maximum Ldnmr under the MTR centerline for any one segment of an MTR. No significant changes in noise levels would occur along MTRs as a result of ARS 1. In fact, maximum Ldnmr along any one segment of an MTR drops in many circumstances.

4.2.2 Warning Areas

Projected operations in off-shore warning areas adjacent to NAS Oceana are presented in Table 4.2-2. As discussed above, no projected noise levels were calculated for these areas because of the type of operations that occur there. Discussions of the operational effects of these projected changes are provided below.

TACTS Range

Projected operations in the TACTs Range are presented in Table 4.2-2. Based upon the average time for each projected sortie, projected aircraft operations in this range would represent an average daily utilization level of 83% (ATAC 1997).

W-72, W-386, and W-122

Although W-72 may be scheduled for exclusive use in isolated instances, this warning area is not generally scheduled for exclusive use. Therefore, while the projected increase in the level of operations in this area would double (see Table 4.2-2), it could be readily

Table 4.2-1

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 1

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 1			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
VR-0073	A-6	5	0	0	0		52	53
	AV-8B	199	492	6	498			
	EA-6B	39	38	1	39			
	F-14	61	28	0	28			
	F-15	601	589	12	601			
	F-16	72	72	0	72			
	F/A-18	6	6	0	6			
	T-38	4	4	0	4			
	Total	**987**	**1,229**	**19**	**1,248**	**26**		
VR-0085	AV-8B	0	31	1	32		<50	<50
	F-14	50	127	0	127			
	F-15	464	464	0	464			
	F-16	19	19	0	19			
	F/A-18	11	58	0	58			
	EA-6B	0	83	0	83			
	KC-130	0	32	0	32			
	Total	**544**	**814**	**1**	**815**	**50**		
VR-1040	A-10	9	9	0	9		52	51
	AV-8B	101	31	1	32			
	KC-130	28	32	0	32			
	EA-6B	78	83	0	83			
	F-14	0	127	0	127			
	F-16	520	520	0	520			
	F/A-18	18	58	0	58			
	Total	**754**	**860**	**1**	**861**	**14**		
VR-1043	A-6	405	0	0	0		55	<50
	AV-8B	64	35	0	35			

Table 4.2-1

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 1

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 1			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	KC-130	32	32	0	32			
	EA-6B	74	74	0	74			
	F-15	28	28	0	28			
	F-16	115	115	0	115			
	F/A-18	37	37	0	37			
	Total	**755**	**321**	**0**	**321**	**-57**		
VR-1046	A-10	9	9	0	9		57	50
	A-6	363	0	0	0			
	AV-8	78	281	0	281			
	EA-6B	37	21	16	37			
	F-15	41	41	0	41			
	F-16	9	9	0	9			
	F/A-18	92	350	16	366			
	F-4	9	9	0	9			
	T-2	4	4	0	4			
	Total	**642**	**724**	**32**	**756**	**18**		
VR-1752	A-4	5	5	0	5		50	<50
	A-6	179	0	0	0			
	AV-8B	6	31	1	32			
	C-17	1	1	0	1			
	KC-130	10	32	0	32			
	EA-6B	167	83	0	83			
	F-111	5	5	0	5			
	F-14	19	127	0	127			
	F-15	191	183	8	191			
	F-16	3	3	0	3			
	F/A-18	23	58	0	58			

Table 4.2-1

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 1

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 1 Day	Night	Total	% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
	TA-4	3	3	0	3			
	Total	612	531	9	540	-12		
VR-1753	A-6	418	0	0	0		51	51
	AV-8B	34	32	2	34			
	C-2	7	7	0	7			
	EA-6B	27	25	2	27			
	F-14	280	747	6	753			
	F-15	144	142	2	144			
	F-16	174	170	4	174			
	F/A-18	8	630	70	700			
	S-3	2	2	0	2			
	Total	1,094	1,755	86	1,841	68		
VR-1754	A-6	134	0	0	0		<50	<50
	CH-53	7	7	0	7			
	EA-6B	69	83	0	83			
	F-14	31	127	0	127			
	F-15	81	75	6	81			
	F-16	3	3	0	3			
	F/A-18	125	58	0	58			
	AV-8B	0	31	1	32			
	KC-130	0	32	0	32			
	Total	450	416	7	423	-6		
VR-1758	A-4	10	10	0	10		56	53
	A-6	448	0	0	0			
	AV-8B	22	31	1	32			
	B-1	7	7	0	7			
	B-52	1	1	0	1			

Table 4.2-1

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 1

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 1			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	EA-6B	139	83	0	83			
	F-14	125	127	0	127			
	F-15	188	184	4	188			
	F-16	8	8	0	8			
	F/A-18	14	58	0	58			
	KC-130	0	32	0	32			
	Total	**962**	**541**	**5**	**546**	**-43**		
VR-1759	A-6	114	0	0	0		<50	<50
	AV-8B	17	31	1	32			
	EA-6B	11	83	0	83			
	F-14	27	127	0	127			
	F-15	9	9	0	9			
	F/A-18	3	58	0	58			
	KC-130	0	32	0	32			
	Total	**181**	**340**	**1**	**341**	**88**		
VR-1074	A-6	17	0	0	0		52	52
	AV-8B	196	307	2	309			
	EA-6B	34	34	0	34			
	F-14	8	8	0	8			
	F-15	403	403	0	403			
	F-16	12	12	0	12			
	F/A-18	16	16	0	16			
	Total	**686**	**780**	**2**	**782**	**14**		

Table 4.2-1

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 1

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 1			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
IR-0714	A-6	74	0	0	0		<50	<50
	EA-6B	99	17	82	99			
	F/A-18	0	110	5	115			
	Total	**173**	**127**	**87**	**214**	24		
Total All MTRs		**7,840**	**8,438**	**250**	**8,688**	11	NA	NA

Source: ATAC 1997; Wyle Labs 1997.

Table 4.2-2

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 1

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 1)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
TACTS Range							
F-14 (NAS Oceana Fleet)	2,869	47	2,916	1,877	21	1,898	
F-14 (NAS Oceana FRS)	543	0	543	546	0	546	
F/A-18 (NAS Oceana Fleet)	0	0	0	3,198	31	3,229	
F/A-18 (NAS Oceana FRS)	0	0	0	138	0	138	
Adversary Aircraft	612	14	626	1,718	25	1,743	
Air Force Jets	704	11	715	459	16	475	
Total	**4,728**	**72**	**4,800**	**7,936**	**93**	**8,029**	**67**
W-72 (exclusive of TACTS Range)							
F-14 (NAS Oceana Fleet)	2,942	58	3,000	4,002	42	4,044	
F-14 (NAS Oceana FRS)	2,739	0	2,739	2,808	0	2,808	
F/A-18 (NAS Oceana Fleet)	0	0	0	5,158	156	5,314	
F/A-18 (NAS Oceana FRS)	0	0	0	4,535	61	4,596	
F/A-18 (Marine Corps)	75	0	75	75	0	75	
KC-130 (MCAS Cherry Point FRS)	4	0	4	4	0	4	
Adversary Aircraft	121	0	121	544	0	544	
Other Navy Aircraft	2,771	204	2,975	2,773	202	2,975	

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Table 4.2-2

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 1

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 1)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
Air Force Jets	1,323	0	1,323	1,329	0	1,329	
Other Air Force Aircraft	69	41	110	70	40	110	
Coast Guard Aircraft	46	33	79	46	33	79	
Contractor	876	0	876	876	0	876	
Civilian	34	37	71	34	37	71	
Total	11,000	373	11,373	22,254	571	22,825	101
W-386 A/B							
F-14 (NAS Oceana Fleet)	0	0	0	98	0	98	
F-14 (NAS Oceana FRS)	14	0	14	17	0	17	
F/A-18 (NAS Oceana Fleet)	0	0	0	276	4	280	
F/A-18 (NAS Oceana FRS)	0	0	0	22	0	22	
F/A-18 (Marine Corps)	15	0	15	15	0	15	
Other Navy Aircraft	360	199	559	362	199	561	
Air Force Jets	3,308	0	3,308	3,424	0	3,424	
Other Air Force Aircraft	75	24	99	75	24	99	
Coast Guard Aircraft	17	2	19	17	2	19	
NASA (missile launches)	183	0	183	183	0	183	
Contractor	7	4	11	7	4	11	

Table 4.2-2

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 1

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 1)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
Civilian	129	27	156	129	27	156	
Total	**4,108**	**256**	**4,364**	**4,625**	**260**	**4,885**	**12**
W-386 D							
F-14 (NAS Oceana Fleet)	275	5	280	325	5	330	
F-14 (NAS Oceana FRS)	684	0	684	684	0	684	
F/A-18 (NAS Oceana Fleet)	0	0	0	179	0	179	
Adversary Aircraft	0	0	0	0	0	0	
Air Force Jets	3	0	3	83	0	83	
NASA (missile launches)	183	0	183	183	0	183	
Total	**1,145**	**5**	**1,150**	**1,454**	**5**	**1,459**	**27**
W-122							
F-14 (NAS Oceana Fleet)	718	44	762	474	56	530	
F-14 (NAS Oceana FRS)	123	0	123	104	0	104	
F/A-18 (NAS Oceana Fleet)	0	0	0	565	16	581	
Adversary Aircraft	0	0	0	0	0	0	
F/A-18 (Marine Corps)	551	68	619	546	73	619	
AV-8 (Cherry Point Fleet)	2,130	32	2,162	2,126	35	2,161	

Table 4.2-2

PROJECTED 1999 SORTIES IN WARNING AREAS ARS 1

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 1)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
AV-8 (MCAS Cherry Point FRS)	1,316	0	1,316	1,311	0	1,311	
EA-6B (MCAS Cherry Point Fleet)	1,606	15	1,621	1,610	15	1,625	
KC-130 (MCAS Cherry Point Fleet)	144	0	144	144	0	144	
KC-130 (MCAS Cherry Point FRS)	231	0	231	231	0	231	
Other Navy Aircraft	452	184	636	454	182	636	
Air Force Jets	4,852	573	5,425	4,849	580	5,429	
Other Air Force Aircraft	270	60	330	270	60	330	
Coast Guard Aircraft	40	4	44	40	4	44	
Contractor	34	9	43	34	9	43	
Civilian	774	63	837	774	63	837	
Total	**13,241**	**1,052**	**14,293**	**13,532**	**1,093**	**14,625**	**2**

Source: ATAC 1997.

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accommodated and cause little effect to area performance. W-386 and W-122 would have minimal increases, ranging from 2% to 27% above 1997 levels.

4.2.3 Military Operating Areas

With respect to the Stumpy Point MOA, even with the addition of F/A-18s associated with ARS 1, it is projected that usage would decrease (see Table 4.2-3). Total operations would drop from 56 to 34. Consequently, the proposed action would not significantly affect the performance of this MOA because multiple operations would not occur concurrently.

4.2.4 Restricted Areas

Projected sorties within restricted areas (i.e., exclusive of operations at target ranges) are presented in Table 4.2-4. As discussed in Section 3.2.5, operations for R-5314 are not presented because the majority of operations occurring at R-5314 are associated with activity at the Dare County Range (see Table 4.3-1). No significant increase in operations or noise would occur as a result of ARS 1. Operations in R-5306A and R-5306D, exclusive of BT-9 and BT-11, would increase by less than 1%. Noise levels would remain relatively constant, with Ldnmrs of less than 50 dB and 54 dB, respectively.

Table 4.2-3

PROJECTED 1999 SORTIES IN THE STUMPY POINT MILITARY OPERATING AREA

User/Service Category	1997 Total	Projected 1999 Operations			Percent Change
		Day (0700-2200)	Night (2200-0700)	Total	
F-14 (NAS Oceana Fleet)	56	26	0	26	-54
F/A-18	0	8	0	8	NA
Total	56	34	0	34	-39

Key:

NAS = Naval Air Station.

Source: ATAC 1997.

Table 4.2-4

PROJECTED 1999 RESTRICTED AREA SORTIES AND NOISE LEVELS ARS 1

Restricted Area	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 1			% Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
			Day (0700-2200)	Night (2200-0700)	Total			
R-5306A (exclusive of BT-9 and BT-11)	A-10	30	29	0	29		<50	<50
	AH-1	136	136	0	136			
	AV-8B (Fleet)	1,021	1,039	10	1,049			
	AV-8B (FRS)	1,553	1,552	2	1,554			
	EA-6B	288	282	9	291			
	F/A-18 (Marine Corps)	91	89	0	89			
	F-15	56	60	0	60			
	F-16	212	208	4	212			
	F-16 (Air National Guard)	26	26	0	26			
	Other Jet	35	35	0	35			
	Other Prop	90	90	0	90			
	Total	**3,538**	**3,546**	**25**	**3,571**	**<1**		
R-5306D	F/A-18	306	307	0	307		54	54
	AV-8B (Fleet)	562	582	0	582			
	KC-130 (Fleet)	22	22	0	22			
	KC-130 (FRS)	34	34	0	34			

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Table 4.2-4

PROJECTED 1999 RESTRICTED AREA SORTIES AND NOISE LEVELS ARS 1

Restricted Area	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 1			% Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
			Day (0700-2200)	Night (2200-0700)	Total			
R-5306D (cont.)	AH-1	165	160	5	165			
	UH-1	305	300	5	305			
	CH-46	3,360	3,255	105	3,360			
	CH-53	1,370	1,300	70	1,370			
	Total	6,124	5,960	185	6,145	<1		

Key:

dB = Decibel.
Ldnmr = Onset rate adjusted day-night average sound level.

Source: ATAC 1997; Wyle Labs 1997.

4.3 Target Ranges

As with Military Training Areas, implementation of ARS 1 would not require the creation of any new training ranges; F/A-18 aircraft would use BT-9, BT-11, and the Dare County Range. The projected increase in noise levels and the number of sorties for affected target ranges compared to existing operations is presented in Table 4.3-1. For comparative purposes, the projected Ldnmr represents the average noise exposure levels at any point within the respective range.

4.3.1 BT-9 (Brant Island Shoal)

Projected aircraft operations in BT-9 would increase by 41% from 1997 levels as a result of ARS 1. This is primarily the result of projected operations using F-14 and F/A-18 aircraft (ATAC 1997). Based on the existing times of operation discussed in Section 3.1.3, BT-9 would have a total of approximately 3,350 hours available annually for aircraft operations (ATAC 1997). As presented in Table 4.3-2, based upon the average time for each projected sortie, projected aircraft operations in this range would represent an average daily utilization level of 20% (ATAC 1997). Therefore, projected operations would not affect BT-9 range performance.

Based upon the projected level of operations, the projected Ldnmr in BT-9 would be 62 dB, an increase of 2 dB over existing levels (Wyle Labs 1997).

Land Use

Land use impacts resulting from increased noise levels in BT-9 would be minimal. Because a 2 dB increase in noise would generally not be perceptible to individuals under any airspace, no significant impacts to human populations would occur at BT-9. Typically, a 3 dB change is detectable to humans (USEPA 1978). Further, the range is removed from development. As discussed in Section 3.1.3, no major communities are located within 10 to 15 miles (16 to 24 km) of the range. No permanent residence is located within 7 miles (11 km) of BT-9.

Noise levels in these surrounding areas would be significantly lower than in the range itself. In turn, no significant secondary impacts, such as impacts to structures as a result of vibrations associated with aircraft noise, would occur as a result of ARS 1 because noise levels in the range and developed areas near the range would be below acceptable noise levels for residential land uses (i.e., 65 dB).

Table 4.3-1

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 1

Range	Aircraft Type	1997 Sorties			ARS 1 Sorties			% Change	1997 Ldnmr (dB)	ARS 1 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
BT-9	A-10	110	0	110	108	0	108		60	62
	AH-1	78	0	78	88	0	88			
	AV-8B (Fleet)	246	6	252	256	14	270			
	AV-8B (FRS)	25	0	25	60	0	60			
	EA-6B	13	0	13	13	0	13			
	CH-46	75	0	75	85	0	85			
	CH-53	9	2	11	11	2	13			
	F-14 (NAS Oceana Fleet)	68	0	68	254	30	284			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	52	0	52	84	2	86			
	F-16	380	8	388	402	4	406			
	F/A-18 (NAS Oceana Fleet)	0	0	0	308	32	340			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	190	10	200	200	20	220			
	H/UH-1	29	0	29	29	0	29			
	Army Helos[a]	74	8	82	90	8	98			
	Other Jet[b]	43	0	43	36	0	36			
	Other Prop[c]	20	0	20	19	0	19			
	Total BT-9	**1,679**	**62**	**1,741**	**2,310**	**140**	**2,450**	**41**		

Key at end of table.

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Table 4.3-1

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 1

Range	Aircraft Type	1997 Sorties			ARS 1 Sorties			% Change	1997 Ldnmr (dB)	ARS 1 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
BT-11	A-10	120	0	120	120	0	120		68	69
	EA-6B	13	0	13	13	0	13			
	AH-1	107	0	107	97	0	97			
	AV-8B (Fleet)	1,162	36	1,198	1,082	42	1,124			
	AV-8B (FRS)	720	0	720	685	0	685			
	KC-130 (MCAS Cherry Point Fleet)	18	0	18	18	0	18			
	CH-46	123	0	123	113	0	113			
	CH-53	13	2	15	11	2	13			
	F-14 (NAS Oceana Fleet)	494	2	496	688	34	722			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	400	6	406	418	10	428			
	F-16	388	0	388	392	0	392			
	F-16 (Air National Guard)	198	0	198	202	4	206			
	F/A-18 (NAS Oceana Fleet)	0	0	0	1,394	72	1,466			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	362	22	384	354	14	368			
	H/UH-1	43	0	43	43	0	43			
	Army Helos[a]	80	8	88	72	0	72			
	Other Jet[b]	14	3	17	21	3	24			
	Other Prop[c]	17	0	17	18	0	18			
	Total BT-11	**4,539**	**107**	**4,646**	**6,008**	**209**	**6,217**	34		

Key at end of table.

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Table 4.3-1

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 1

Range	Aircraft Type	1997 Sorties			ARS 1 Sorties			% Change	1997 Ldnmr (dB)	ARS 1 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
Dare County Range	A-10	14	0	14	16	0	16		65	65
	AV-8B (Fleet)	68	0	68	54	4	58			
	AV-8B (FRS)	10	0	10	6	0	6			
	EA-6B	5	0	5	5	0	5			
	F-14 (NAS Oceana Fleet)	2,986	38	3,024	2,684	72	2,756			
	F-14 (NAS Oceana FRS)	1,027	0	1,027	972	0	972			
	F-14 (Other Navy)	9	0	9	9	0	9			
	F-15	156	4	160	106	2	108			
	F-16	346	4	350	326	2	328			
	F-16 (Air National Guard)	498	26	524	504	16	520			
	F/A-18 (NAS Oceana Fleet)	0	0	0	1,454	198	1,652			
	F/A-18 (NAS Oceana FRS)	0	0	0	573	91	664			
	F/A-18 (Adversary)	12	0	12	27	0	27			
	F/A-18 (Other Navy)	53	0	53	53	0	53			
	F/A-18 (Marine Corps)	26	6	32	26	2	28			
	T-34[d]	0	0	0	22	0	22			
	F-15	1,305	102	1,407	1,305	102	1,407			
	F-16	401	4	405	401	4	405			
	A-10	44	0	44	44	0	44			
	AV-8B	81	0	81	81	0	81			
	EA-6B	1	0	1	1	0	1			
	F-14	63	0	63	63	0	63			

Key at end of table.

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Table 4.3-1

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 1

Range	Aircraft Type	1997 Sorties			ARS 1 Sorties			% Change	1997 Ldnmr (dB)	ARS 1 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
Dare County Range (cont.)	F/A-18	1	0	1	1	0	1			
	OA-10	7	0	7	7	0	7			
	Total Dare County Range	7,113	184	7,297	8,740	493	9,233	27		

[a]Modeled as AH-64.
[b]Modeled as F/A-18.
[c]Modeled as C-130.
[d]Not modeled.

Key:

BT = Bombing target.
FRS = Fleet Replacement Squadron.

Source: ATAC 1997; Wyle Labs 1997.

Table 4.3-2

PROJECTED ANNUAL BT-9 UTILIZATION - ARS 1

User/Service Group	Scheduled Hours Day (0700-2200)	Scheduled Hours Night (2200-0700)	Scheduled Hours Total	Used Hours Day (0700-2200)	Used Hours Night (2200-0700)	Used Hours Total
Navy Total	**131**	**48**	**180**	**114**	**43**	**157**
F-14 (NAS Oceana Fleet)	31	6	37	25	5	31
F/A-18 (NAS Oceana Fleet)	47	7	54	38	7	45
Navy Exercise	53	35	88	50	31	82
Marine Corps Total	**233**	**32**	**265**	**214**	**31**	**245**
AV-8 (Fleet)	49	18	67	49	18	67
AV-8 (FRS)	19	0	19	19	0	19
F/A-18	72	12	83	62	11	73
AH-1	34	0	34	30	0	30
CH-46	43	0	43	39	0	39
CH-53	1	2	4	1	2	4
UH-1	15	0	15	14	0	14
Air Force Total	**140**	**13**	**154**	**123**	**12**	**135**
F-15	17	7	25	16	7	23
F-16	95	3	98	83	2	85
A-10	28	3	31	25	3	27
Army Total	**8**	**3**	**11**	**7**	**3**	**10**
Army Helicopters	8	3	11	7	3	10
Other Total	**56**	**11**	**68**	**46**	**10**	**57**
Other Jets	15	11	27	15	10	25
Other Props	41	0	41	32	0	32
TOTAL	**569**	**109**	**677**	**505**	**99**	**604**
Overtime Hours			52			
Non-Overtime Scheduled Hours			626			
Published Hours			3,350			
Percentage Utilization			20%			

Note: Figures may not total due to rounding.

Source: ATAC 1997.

Water Quality

During the training that would be conducted under ARS 1, F/A-18 aircraft would drop practice bombs equipped with one or two signal cartridges (Thompson 1996). The practice bombs are made of inert materials such as iron and concrete and, thus, would not adversely affect water quality at BT-9. Three different signal cartridges, the MK-4, CXU-3, and CXU-4, are used with the practice bombs. The MK-4 cartridge contains approximately 65 grams of red phosphorus which produces a bright flash (for night use) and white smoke (for day use) when ignited on impact. The CXU-3 and CXU-4 cartridges contain approximately 1 fluid ounce and 2 fluid ounces, respectively, of titanium tetrachloride, a liquid that produces white smoke when exposed to air or moisture.

The combustion of red phosphorus produces phosphorus oxides. Although phosphorus oxides have a low toxicity to aquatic organisms (Yon et al. 1983), elevated phosphorus levels can cause algal blooms and increased eutrophication in aquatic systems where phosphorus limits primary production (Wetzel 1983). It is possible to determine if phosphorus limits primary production in Pamlico Sound by examining the molar ratio of nitrogen-to-phosphorus (N:P ratio) in this water body. The critical value of the N:P ratio is 7; this is based on the typical N:P ratio in biomass of algae and aquatic macrophytes which is 7:1 (Wetzel 1983). Values of the ratio greater than 7 indicate that phosphorus is in short supply and limits primary production. Values of the ratio less than 7 indicate that the system is enriched with phosphorus and, thus, is nitrogen limited. The N:P ratio in Pamlico Sound near BT-9 (calculated from inorganic nutrient data reported by Sirrine [1991]) is approximately 1.5. The N:P ratio is less than 7; this suggests that primary production in Pamlico Sound is nitrogen limited and, thus, that inputs of phosphorus oxides from signal cartridges (or other sources) would not stimulate primary production. Large estuaries such as Pamlico Sound are typically enriched with phosphorus because their position at the end of large drainage basins subjects them to phosphorus inputs from multiple upstream sources (Horne 1978). The toxicity of unreacted red phosphorus to aquatic life is discussed under the Aquatic Resources section (see below).

Titanium tetrachloride ($TiCl_4$) undergoes rapid hydrolysis in surface water to form chloride ion (Cl^-), hydrogen ion (H^+), and a titanium hydroxide complex ($Ti(OH)_4$) (Uhrmacher et al. 1985). These breakdown products would not adversely affect water quality in the vicinity of BT-9. Chloride ion is naturally abundant in marine and estuarine waters. Consequently, the chloride contribution from CXU-3 and CXU-4 signal cartridges to surface water chloride levels at BT-9 would be minor. Because marine and estuarine water bodies are characterized by high alkalinity (i.e., they act as buffers) (Meadows and Campbell 1978),

hydrogen ion inputs from the CXU-3 and CXU-4 signal flares would not affect surface water pH at BT-9. Because the titanium concentration in seawater is low (0.001 ppm, Horne 1978), the level may increase in the immediate vicinity where a CXU-3 or CXU-4 signal cartridge discharges. However, dilution with nearby unaffected surface water would make such increases temporary in nature. The toxicity of titanium to aquatic organisms is discussed under the Aquatic Resources section (see below).

Given the projected increase in operations by F/A-18 aircraft at BT-9 under ARS 1, there may be an increased potential for aircraft mishaps (see Appendix G). Water quality at BT-9 could be adversely affected by F/A-18 aircraft if one or more were to crash in the area and release fuel and/or hydraulic fluids into the water. The magnitude and duration of the impact would depend on numerous factors such as the amount of fuel released, wind speed (because it affects wave action), and temperature (because it affects the rate of hydrocarbon volatilization). Actions currently being taken to mitigate such an occurrence include strengthening rescue and spill response procedures.

Aquatic Resources

Aquatic resources of Pamlico Sound would not be adversely impacted by weapon releases (i.e., practice bombs) from F/A-18 aircraft under ARS 1, because the bombs are made of inert materials such as iron and concrete. The compounds used in the signal cartridges, red phosphorus and titanium tetrachloride, would not adversely impact the aquatic resources of Pamlico Sound. The red phosphorus is largely converted to phosphorus oxides when the signal cartridge discharges and these oxides have a low toxicity to aquatic organisms (Yon et al. 1983). There is no evidence that unreacted red phosphorus is toxic to aquatic life (Uhrmacher et al. 1985). The production of red phosphorus by manufacturers sometimes includes a limited amount of white phosphorus as an impurity. Although white phosphorus may be toxic to aquatic biota, particularly to fish (Sullivan et al. 1979), any white phosphorus introduced to BT-9 would likely be rapidly diluted by wave action and, therefore, have no effect on fish or other aquatic life in the area. The limited information available on the aquatic toxicology of titanium indicates that this element can be acutely toxic to some species of algae and zooplankton at concentrations between 2 and 4.6 mg/L (Uhrmacher et al. 1985). Although it is possible that the titanium concentration in surface water at BT-9 may be elevated to these levels in the immediate vicinity of a signal cartridge discharge, rapid dilution would occur as a result of wave action.

Finally, it is anticipated that there will be no effect to threatened or endangered aquatic species under ARS 1 given that F/A-18s will drop only inert ordnance at BT-9. In

addition, the BT-9 target is located on Brant Island Shoal which is more shallow than surrounding waters. Sea turtles typically inhabit the deeper waters of Pamlico Sound. The area does not represent critical or exceptional habitat for the three species of concern (the green, Kemp's Ridley, and loggerhead sea turtles). Individuals would be present only incidentally during foraging throughout the sound.

There may be a potential for aircraft mishaps in the vicinity of BT-9, resulting in release of fuel and/or hydraulic fluids that have the potential to adversely affect aquatic resources in Pamlico Sound (see Appendix G). As mentioned above, the magnitude and duration of the impact would depend on numerous factors such as the amount of fuel and/or hydraulic fluid released, wind speed (because it affects wave action), and temperature (because it affects the rate of hydrocarbon volatilization). The magnitude and duration of the impact would be controlled through rescue and spill response procedures. The Navy and Marine Corps are in the process of developing an emergency response plan to identify responsible agencies and actions required to quickly contain spills at BT-9 (Noble 1996).

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 4.3-3. Emissions were calculated using the same aircraft data to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 4.3-3. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases would be less than 1 ton per year and would not affect air quality in the area.

4.3.2 BT-11 (Piney Island)

Projected aircraft operations in BT-11 would increase by 34% as a result of implementation of ARS 1. This is primarily the result of projected operations by F/A-18 and F-14 aircraft. Because the hours of operations are the same as BT-9, BT-11 would also have a total of approximately 3,350 hours available annually for aircraft operations (ATAC 1997). As presented in Table 4.3-4, based upon the average time for each projected sortie, projected aircraft operations in this range would represent an average daily utilization level of 51% (ATAC 1997). Therefore, projected operations would not affect BT-11 range scheduling.

Based upon the projected level of operations, the projected Ldnmr in BT-11 would be 69 dB, representing an increase of 1 dB over existing levels (Wyle Labs 1997).

Table 4.3-3

PROJECTED EMISSIONS - BT-9 ARS 1

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr)
F-14B/D	19	0.0013	0.0309	0.0037	0.0008	0.0071
F/A-18	41	0.0110	0.0530	0.0272	0.0012	0.0131
AV-8	314	0.0237	0.1762	0.1707	0.0085	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	108	0.0066	0.0171	0.0534	0.0015	0.0077
F-16	24	0.0003	0.0288	0.0030	0.0004	0.0006
F-15	5	0.0001	0.0061	0.0006	0.0001	0.0001
All Helicopters	313	0.1082	0.2600	1.0337	0.0345	0.0000
Other Jets	18	0.0011	0.0004	0.0082	0.0001	0.0008
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**852**	**0.1547**	**0.5757**	**1.3054**	**0.0473**	**0.0294**
Net Change From 1997	**117**	**0.0224**	**0.1076**	**0.1651**	**0.0066**	**0.0104**

Notes: Annual operations below 3,000 feet obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all helicopter operations are below 3,000 ft.

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Table 4.3-4

PROJECTED ANNUAL BT-11 UTILIZATION - ARS 1

User/Service Group	Scheduled Hours			Used Hours		
	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Navy Total	**476**	**110**	**586**	**409**	**96**	**505**
F-14 (NAS Oceana Fleet)	140	9	148	115	8	123
F/A-18 (NAS Oceana Fleet)	283	66	350	243	57	300
Navy Exercise	53	35	88	50	31	82
Marine Corps Total	**602**	**125**	**727**	**581**	**122**	**703**
AV-8 (Fleet)	162	100	262	162	100	262
AV-8 (FRS)	210	9	219	210	9	219
F/A-18	97	14	112	86	12	98
KC-130 (MCAS Cherry Point Fleet)	24	0	24	24	0	24
AH-1	37	0	37	33	0	33
CH-46	50	0	50	45	0	45
CH-53	1	3	4	1	2	3
UH-1	19	0	19	18	0	18
Air Force Total	**277**	**35**	**312**	**247**	**32**	**279**
F-15	110	26	136	99	23	123
F-16	90	3	93	77	3	80
F-16 (Air National Guard)	51	3	54	47	3	49
A-10	25	4	29	23	3	27
Army Total	**31**	**1**	**32**	**30**	**1**	**31**
Army Helicopters	31	1	32	30	1	31
Other Total	**55**	**2**	**57**	**54**	**2**	**56**
Other Jets	23	2	25	22	2	24
Other Props	32	0	32	32	0	32
TOTAL	1,441	274	1,715	1,320	254	1,570
Overtime Hours			52			
Non-Overtime Scheduled Hours			1,663			
Published Hours			3,350			
Percentage Utilization			51%			

Note: Figures may not total due to rounding.

Source: ATAC 1997.

Land Use

Land use impacts resulting from increased noise levels in BT-11 would be minimal. No major communities are located within 5 miles (8 kilometers) of BT-11. Noise levels in the surrounding areas would be significantly lower based on their distance from the range. In addition, no significant secondary impacts (e.g., impacts to structures as a result of vibrations associated with aircraft noise) would occur as a result of ARS 1. Noise levels in developed areas would be well below acceptable noise levels for residential land uses.

Water Quality

For the reasons discussed in Section 4.3.1 for Brant Island Shoal (BT-9), no adverse impacts to water quality at Piney Island (BT-11) are expected as a result of increased operations by F/A-18 aircraft under ARS 1.

Aquatic Resources

For the reasons discussed above for Brant Island Shoal (BT-9), no adverse impacts to aquatic resources at Piney Island (BT-11) are expected as a result of increased operations by F/A-18 aircraft. Finally, it is anticipated that there would be no effect to threatened or endangered aquatic species under ARS 1 given that F/A-18s would drop only inert ordnance at BT-11.

Terrestrial Resources

No adverse impacts to the vegetative communities at Piney Island are expected as a result of increased operations by F/A-18 aircraft under ARS 1. Although range fires (caused by signal cartridges on practice bombs) would continue as a result of training, the fires are supportive of the continuation of the black needlerush (*Juncus romerianus*) marsh community that predominates on the island (see Section 3.1.3).

Possible impacts on Piney Island wildlife that could result from increased use of the area by F/A-18 aircraft include increased smoke from the CXU-3, CXU-4, and MK-4 signal cartridges; chemical residues from these cartridges; and/or increased noise. The MK-4 cartridge contains red phosphorus, and the CXU-3 and CXU-4 cartridges contain titanium tetrachloride. Both compounds produce white smoke when the signal cartridges discharge on impact. Both red phosphorus smoke and titanium tetrachloride smoke have been shown to be toxic to laboratory animals at high concentrations in enclosed spaces (Uhrmacher et al. 1985). It is not anticipated that smoke produced from these compounds would adversely impact

wildlife at Piney Island because breezes would cause the smoke to dissipate. Although trace amounts of unreacted red phosphorus may be introduced to the Piney Island environment as a result of F/A-18 aircraft training, it is unlikely to adversely impact resident wildlife because red phosphorus is relatively nontoxic to animals (Uhrmacher et al. 1985); the LD50 for laboratory rats is greater than 10,000 mg/kg body weight (Henry et al. 1981 as cited in Uhrmacher et al. 1985). The production of red phosphorus may result in a product that includes white phosphorus as an impurity. Although unreacted white phosphorus can be toxic to waterfowl if ingested (Racine et al. 1992), only trace amounts are likely to be present as an impurity in red phosphorus.

No data are available on the toxicity of unreacted titanium tetrachloride to birds and mammals (Uhrmacher et al. 1985). However, because the compound is a liquid that reacts rapidly when exposed to air or moisture, it is not expected that a residue of the unreacted compound would accumulate on Piney Island.

A number of federal- or state-listed bird species are known to live and/or nest at the Piney Island range. High noise events (like a low-level overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Bowles and Awbrey 1990; Grubb and King 1991; Ellis et al. 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant (*Branta bernicla nigricans*) (Ward et al. 1990) to 85 dB for crested tern (*Sterna bergii*) (Brown 1990).

1997 maximum Ldnmr at BT-11 is 68 dB. Noise events at these levels may elicit responses from nesting birds (Ward et al. 1990). However, a 1996 study by Fleming et al. showed that only a small proportion (2.6%) of wild ducks at BT-11 displayed a reaction to aircraft overflights, and ducks were observed feeding in bays and ponds directly in the flight approach path. Overall, the studies of noise impacts at BT-11 indicate that no significant impact is occurring for adult, wintering waterfowl at BT-11. While ducks examined at BT-11 produced fewer young, and the young showed depressed growth compared to a control site, noise was not proven to be the cause (Brown 1990).

Under ARS 1, maximum Ldnmr are projected to increase by one decibel to 69 dB. A change of this small magnitude is not likely to have any impact on wildlife, including listed

species, at BT-11. In 1996, Fleming et al. observed that birds rapidly (within a few days) acclimate to high noise events. Therefore, given that birds at BT-11 have become acclimated to aircraft overflights, the projected increase in maximum noise exposure of 1 dB would not adversely affect local bird populations.

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 4.3-5. Emissions were calculated using the same aircraft data to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 4.3-5. Emissions of NO_x and PM_{10} slightly increase while emissions of VOCs, CO, and SO_2 slightly decrease. There is a small decrease in total annual operations below 3,000 feet AGL. However, although individual aircraft models emitting the majority of the NO_x and PM_{10} would operate more frequently compared to 1997, the net change for NO_x and PM_{10} would be minimal. All emission increases are less than 1 ton per year and would not affect air quality in the area.

4.3.3 Dare County Range

Projected aircraft operations in the Dare County Range would increase by 37% as a result of the implementation of ARS 1. This is primarily the result of a projected increase in operations by F/A-18 and F-14 aircraft, coupled with a significant decrease in A-6 aircraft operations (ATAC 1997). Based on published hours of operations, the Dare County Range would have a total of approximately 4,000 weekday hours available annually (ATAC 1997). As presented in Table 4.3-6, based on the average time for each projected sortie, projected aircraft operations in this range would represent an average utilization level of 67% (ATAC 1997). Therefore, projected operations would not affect the performance at this range.

Based upon the projected level of operations, the projected Ldnmr in the Dare County Range would be 65 dB, representing no increase over 1997 levels (Wyle Labs 1997).

Land Use

No land use impacts resulting from noise levels at the Dare County Range would occur. No major communities are located within 5 miles (8 kilometers) of this range. Further, noise levels in residential communities would be similar to existing conditions (Wyle Labs 1997).

Table 4.3-5

PROJECTED EMISSIONS - BT-11 ARS 1

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	45	0.0031	0.0740	0.0089	0.0020	0.0171
F/A-18	105	0.0279	0.1350	0.0692	0.0030	0.0334
AV-8	1,719	0.1300	0.9657	0.9355	0.0467	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	120	0.0073	0.0190	0.0593	0.0016	0.0085
F-16	36	0.0004	0.0424	0.0044	0.0006	0.0008
F-15	26	0.0003	0.0303	0.0031	0.0004	0.0006
All Helicopters	338	0.1168	0.2807	1.1163	0.0373	0.0000
Other Jets	12	0.0007	0.0003	0.0055	0.0001	0.0006
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**2,411**	**0.2892**	**1.5506**	**2.2071**	**0.0919**	**0.0610**
Net Change from 1997	**-49**	**-0.0005**	**0.0282**	**-0.1295**	**-0.0043**	**0.0285**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all helicopter operations are below 3,000 ft.
KC-130 operations ignored; aircraft not expected to descend below 3,000 ft. AGL because it is an in-flight refueling aircraft.

Table 4.3-6

PROJECTED ANNUAL DARE COUNTY RANGE UTILIZATION - ARS 1

User/Service Group	Scheduled Hours			Used Hours		
	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Navy Total	2,050.8	401.5	2.452.3	1,760.0	342.5	2,102.5
F-14 (NAS Oceana Fleet)	1,038.6	169.4	1,208.0	886.5	142.4	1,028.9
F-14 (NAS Oceana FRS)	555.3	0.0	555.3	481.0	0.0	481.0
F/A-18 (NAS Oceana Fleet)	324.9	118.1	443.0	276.3	101.9	378.1
F/A-18 (NAS Oceana FRS)	93.0	114.0	207.0	79.5	98.3	177.8
Adversary	21.8	0.0	21.8	20.3	0.0	20.3
Navy Exercise	17.3	0.0	17.3	16.5	0.0	16.5
Marine Corps Total	11.0	10.5	21.5	11.0	10.5	21.5
AV-8 (Fleet)	5.3	8.3	13.5	5.3	8.3	13.5
AV-8 (FRS)	2.3	0.0	2.3	2.3	0.0	2.3
F/A-18	3.5	2.3	5.8	3.5	2.3	5.8
Air Force Total	195.0	24.3	219.3	169.3	21.5	190.8
F-15	23.3	7.5	30.8	19.5	6.3	25.8
F-16	74.5	1.8	76.3	65.0	1.8	66.8
F-16 (Air National Guard)	95.5	13.5	109.0	83.0	12.0	95.0
A-10	1.8	1.5	3.3	1.8	1.5	3.3
TOTAL	2,256.8	436.3	2,693.0	1,940.3	374.5	2,314.8
Overtime Hours			18.0			
Non-Overtime Scheduled Hours			2,675.0			
Published Hours			4,000.0			
Percentage Utilization			67%			

ARS 1 would not result in significant effects to the operations of the Dare County Airport in Manteo. Although aircraft operations at the Dare County Range are projected to increase by 37%, military aircraft will continue to ingress and egress primarily from areas northwest of the range. As discussed in Section 1, the Navy F/A-18 mission is part fighter and part attack, a role that borrows elements from the Navy F-14 and A-6 communities. The F/A-18 aircraft's operating speeds are similar to the F-14, and the Navy F/A-18 squadrons would transit to and from most training areas as do the Navy F-14 squadrons. Unlike the A-6 squadrons, Navy F/A-18 squadrons currently do not conduct all-weather missions. Additionally, the F/A-18 squadrons perform low-level missions (flights utilizing visual MTRs) with a much lower frequency than the A-6 squadrons (ATAC 1997). Currently, the average number of sorties per day (weekday) conducting operations in the northern half of R-5314 is approximately 20. Under ARS 1, the introduction of 11 F/A-18 fleet squadrons and the F/A-18 FRS to NAS Oceana results in a six-sortie per day increase (26 sorties) at the Navy Dare County Range.

In the last 2 to 5 years, no reports have been filed regarding significant conflicts (e.g., midair collisions, near misses, etc.) between military and civilian aircraft in this area, either within the range or in surrounding airspace (ATAC 1997). While past conflicts associated with A-6 operations in the range have occurred in utilizing one of the Dare County Airport approach routes under instrument conditions, these are expected to be reduced now that A-6 aircraft are decommissioned. Therefore, no significant additional constraints would be placed on civilian aircraft departures/approaches at this airport (see Appendix C for a more detailed discussion).

Water Quality

As discussed in Section 4.3.1 for Brant Island Shoal (BT-9), no adverse impacts to water quality at the Dare County Range would occur as a result of increased operations by F/A-18 aircraft. As discussed in Section 3.1.3, aquatic resources at the Dare County Range are limited to only streams and creeks that traverse the area, and increased range operations under ARS 1 would not affect resources in the Alligator River, Croatan Sound, or other major water bordering the Dare County peninsula.

Aquatic Resources

As discussed in Section 4.3.1 for Brant Island Shoal (BT-9), no adverse impacts to aquatic resources at the Dare County Range should occur as a result of increased operations by F/A-18 aircraft. Finally, it is anticipated that there would be no effect to threatened and

endangered aquatic species under ARS 1 given that F/A-18s would drop only inert ordnance at the Dare County Range.

Terrestrial Resources

The vegetative communities of the Dare County Range would not be significantly impacted by the increased F/A-18 aircraft operations. Forestry resources on the range are managed to support aircraft operations. While range fires would continue to occur as a result of training (caused by signal cartridges on practice bombs), the occasional fires are actually supportive of the continuation of the vegetative communities (see Section 3.1.3). However, existing measures for fire suppression would continue to control any fires from damaging surrounding land.

As discussed in Section 4.3.1, no adverse impacts to wildlife are expected from the smoke-producing compounds (red phosphorus and titanium tetrachloride) from the signal cartridges used in practice bombs.

Three listed bird species are known to occur at the Dare County Range. A discussion of potential impacts on birds from aircraft overflights is presented in Section 4.3.2. The 1997 maximum Ldnmr at the Dare County Range is 65 dB. Under ARS 1, the maximum Ldnmr would not increase; therefore, there would be no impacts on local bird populations.

Air Quality

A slightly different mix of aircraft types use the Dare County Range compared to BT-9 and BT-11. Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 4.3-7. Emissions were calculated using the same aircraft data to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 4.3-7. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases would be less than 1 ton per year and would not affect air quality in the area.

Table 4.3-7

PROJECTED EMISSIONS - DARE COUNTY RANGE ARS 1

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	224	0.0154	0.3680	0.0441	0.0098	0.0848
F/A-18	121	0.0322	0.1559	0.0799	0.0034	0.0386
AV-8	61	0.0046	0.0342	0.0331	0.0017	0.0000
EA-6B	4	0.0010	0.0012	0.0019	0.0001	0.0000
A-10	16	0.0010	0.0025	0.0079	0.0002	0.0011
F-16	51	0.0005	0.0601	0.0062	0.0009	0.0011
F-15	6	0.0001	0.0077	0.0008	0.0001	0.0001
T-34	1	0.0000	0.0000	0.0007	0.0000	0.0000
Total	**484**	**0.0548**	**0.6295**	**0.1738**	**0.0162**	**0.1258**
Net Change from 1997	**81**	**0.0287**	**0.1052**	**0.0661**	**0.0020**	**0.0297**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.

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4.4 NAS Oceana and NALF Fentress Land Use

4.4.1 Projected Land Use

To support the realignment of the F/A-18 aircraft to NAS Oceana under ARS 1, several construction projects would be required. Generally, these actions would result in minor long-term land use changes at the station. The majority of the construction actions are designed to take maximum advantage of existing space and facilities at the station through reuse or additions to existing buildings. This would minimize potential land disturbance and provide for efficient development.

4.4.2 Land Use Plans and Policies

The proposed projects would be generally consistent with existing land uses and the land classifications in the station's Master Plan (LANTDIV 1985). Proposed new maintenance, training, and medical facilities are to be located in areas where similar facilities exist. Project descriptions, disturbance impacts, and land use classifications are discussed below.

- The F/A-18 parking apron alterations would result in no new impervious surface and be limited to installation of blast plates and utility systems along the flight line. The Master Plan designates this project area for "airfield operations" land uses.

- The parking apron expansion would result in 20 acres of new impervious surface. The Master Plan designates this as "vegetation/open".

- The new F/A-18 hangar would result in 0.8 acre of new impervious surface. The Master Plan designates this as "vegetation/open".

- The F/A-18 flight simulator facility addition would result in 0.4 acre of impervious surface. The majority of the project area is maintained grass with a limited amount of impervious surfaces. The Master Plan designates this area as for "training" land uses.

- The NAMTRAGRUDET Training Facility would result in 0.3 acre of impervious surface and require the removal of a maintained lawn with a few large trees. The Master Plan designates this area as for "training" land use.

- The Striker Fighter Weapon School addition would result in 0.8 acre of impervious surface, of which 0.1 acre is currently in a maintained grass area. The Master Plan designates this area as for "training" land uses.

- The F/A-18 aviation maintenance facilities would involve additions to Buildings 301, 401, and 513. Additionally, this project would include construction of two buildings adjacent to Building 410 and

the construction of two parking areas. The project would result in 2.6 acres of impervious surface. Where additions would be constructed, the area is either maintained grass or paved surface. The 44,400-square-foot parking area would be located in an open grass/dirt area along 8th Street. The site of the 40,000-square-foot parking area and the armament storage building is a wooded area along "B" Avenue. With the exception of the armament building and the "B" Avenue parking area sites (designated as vegetation/open space), the Master Plan identifies these areas as for "maintenance/production" land uses.

- The corrosion control hangar would result in 0.3 acre of new impervious surface. The majority of the site for the proposed new building is paved. The remainder of the project would be constructed over a semi-maintained grass area. The Master Plan designates this area as for "maintenance/production" land uses.

- The BEQ would result in approximately 1.5 acres of new impervious surface. The area to be disturbed is currently a wooded recreational area. The Master Plan designates this area as for "personnel support" land uses.

- The jet engine test cell modernization would result in no new impervious surface; the new cell would be entirely in existing paved areas. The Master Plan designates this area as for "maintenance/production" land uses.

- The aircraft acoustical enclosure would result in approximately 0.5 acre of new impervious area. The area to be disturbed is a combination of open field and wooded area. The Master Plan designates this area as for "maintenance/production" land uses.

- The proposed secure vaults in Buildings 122 and 111 would result in no new impervious surface and be limited to installation of vaults and debriefing spaces in hangars for proposed F/A-18 squadrons. The Master Plan designates these areas for "maintenance/production" land uses.

- The renovations to Building 122 would result in no new impervious surfaces and be limited to interior modifications. The Master Plan designates this area for "maintenance/production" land uses.

Because the locations of the projects are significantly removed from surrounding lands, needed construction under ARS 1 would not result in a conflict with surrounding land uses. Furthermore, the proposed projects under ARS 1 are consistent with the Virginia Beach Comprehensive Plan and Zoning Ordinance and the Chesapeake Comprehensive Plan and Zoning Ordinance.

With regard to the station's AICUZ program, aircraft operations associated with ARS 1 would result in significant impacts as a result of greater noise exposure levels (see Section 4.8). These increases would have implications on planning and zoning around NAS Oceana and NALF Fentress. Figure 4.4-1 presents 1999 projected noise contours and land use. Figure 4.4-2 presents the increase between 1978 AICUZ noise contours and projected 1999 noise contours and land use. As shown, larger areas would be exposed to aircraft noise.

With respect to APZs, Figure 4.4-3 depicts 1999 projected APZs, and Figure 4.4-4 depicts the increase/decrease between 1978 APZs and 1999 projected APZs. As shown, implementation of ARS 1 would result in a total increase of 4,586 acres (1,836 hectares) within APZs for NAS Oceana (see Table 4.4-1). Figure 4.4-5 depicts the increase between 1997 APZs and projected 1999 APZs. As shown, under ARS 1, the APZs in and around NAS Oceana would increase from approximately 5,434 acres (2,199 hectares) to 8,428 acres (3,411 hectares).

As discussed in Section 3.1.4, the APZs do not indicate the probability of an accident but rather the probable accident location should an accident occur. Appendix G provides more information on the development of APZs. The Navy's recent update of aircraft accident data for the period from 1982 to 1997 indicates that the F/A-18 experiences fewer accidents than other fighter aircraft in the inventory. In fact, during this period only three F/A-18 Class "A" accidents (i.e., aircraft suffered more than one million dollars in damage or a fatality occurred) were reported within a 5-mile radius of Navy and Marine Corps airfields in the U.S. and Japan.

At NALF Fentress, the proposed realignment would result in an increase of 3,716 acres (1,504 hectares) within APZs between 1978 and 1999 but no increase between existing 1997 and projected 1999 APZs.

Total projected APZ areas at NALF Fentress would cover 3,402 acres (1,377 hectares) of agriculture/rural residential, 1,346 acres (545 hectares) of conservation, 1,092 acres (442 hectares) of military facility, and 229 acres (93 hectares) of residential land uses.

Two school facilities, Seatack Elementary and Linkhorn Elementary, are located within the 1978 APZ 1, north of the station; however, these schools are not located within the 1997 APZ 1. These schools are also located within the 1978 Noise Zone 3 (i.e., Ldn > 75 dB); however, they are located in the 1997 Noise Zone 1 (i.e., Ldn < 65 dB). The Navy and the city have coordinated plans to relocate these schools because school facilities are not

compatible with Noise Zone 3. A new school building for Linkhorn Elementary is currently under construction.

Indirect impacts could occur regarding future private development actions as a result of implementing ARS 1. The City of Virginia Beach's airfield noise attenuation and safety ordinance places additional requirements (i.e., noise attenuation) on private development in high aircraft noise areas (see Section 3.1.4) within AICUZ noise contours and APZs. Because these areas would expand under ARS 1, a greater amount of land around the station would be subject to special restrictions on development. However, current zoning policy in both Virginia Beach and Chesapeake does not require a change to existing zoning due to new AICUZ restrictions.

Implementation of ARS 1 would result in significant changes in noise levels and APZs. This may affect availability of federally guaranteed mortgage loans. HUD, FHA, and VA mortgage policies generally prohibit guaranteeing mortgage loans for new homes located within noise contours of 75 dB Ldn or greater or within clear zones. These same mortgage policies make availability of federally guaranteed mortgage loans discretionary for new homes located within noise contours of 65 to 75 dB Ldn.

The term "new home" includes new construction, existing homes that are less than one year old, and existing homes that have been substantially remodeled. HUD, FHA, or VA mortgage policies may also impose conditions on mortgage loan guarantees (such as written acknowledgment of noise conditions) for existing homes located in 75 dB Ldn or greater contours or within clear zones.

As defined in 16 USC 1453, federal property is excluded from the coastal zone. The Coastal Zone Management Act Reauthorization Amendments of 1990 require that "...each federal agency activity within or outside the coastal zone that affects any land or water use or natural resources of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs." The projects at NAS Oceana under ARS 1 would not adversely impact any land or water use or natural resource of Virginia's coastal zone; therefore, ARS 1 is considered to be consistent to the maximum extent practicable with Virginia's coastal zone program.

The implementation of ARS 1 would require approval under Virginia's enforceable permit programs. Specifically, it would require VPDES permitting for land disturbance of more than 5 acres (see Section 4.11) and compliance with Virginia's implementation of the federal Clean Air Act (see Section 4.9). Compliance with procedural requirements of these programs would demonstrate consistency with Virginia's coastal zone management program. In addition, ARS 1 would be consistent with the requirements of the North Carolina coastal

zone management program. Specifically, those requirements are related to the increase in aircraft operations that would occur in coastal target ranges in North Carolina (see Section 4.3). Potential impacts to the resources in the coastal zone will be minimized to the maximum extent practicable through agency reviews (NCDEHNR, Division of Coastal Management), permitting requirements, and implementation of best management practices.

Because needed construction under ARS 1 minimizes land disturbance and loss of natural areas to the greatest extent practicable, it would be consistent with the station's Integrated Natural Resource Management Plan.

Table 4.4-1

LAND USE WITHIN EXISTING (1978 AND 1997) AND PROJECTED (1999) APZs AT NAS OCEANA

Land Use	1978 Acres/ Hectares	1997 Acres/ Hectares	Projected Acres/ Hectares	Area Change 1978/1999 (Acres/Hectares)	Area Change 1997/1999 (Acres/Hectares)
Clear Zone					
Military Facility	578/234	684/277	684/277	106/43	0/0
Business/Research	0/0	0/0	0/0	0/0	0/0
Industrial	0/0	1/<1	1/<1	1/<1	0/0
Residential	13/5	19/8	19/8	6/3	0/0
Conservation	0/0	0/0	0/0	0/0	0/0
Public Facilities	0/0	0/0	0/0	0/0	0/0
Retail	0/0	0/0	0/0	0/0	0/0
Mixed Use	42/17	82/33	82/33	40/16	0/0
APZ 1					
Military Facility	268/108	630/255	844/341	576/233	214/86
Business/Research	79/32	4/2	49/20	-30/-12	45/18
Industrial	289/117	438/177	540/219	251/102	102/42
Residential	418/169	459/186	759/307	341/138	300/121
Conservation	87/35	118/48	124/50	37/15	6/2
Public Facilities	30/12	38/15	38/15	8/3	0/0
Retail	0/0	0/0	0/0	0/0	0/0
Mixed Use	135/55	233/94	434/176	299/121	201/82

Table 4.4-1

LAND USE WITHIN EXISTING (1978 AND 1997) AND PROJECTED (1999) APZs AT NAS OCEANA

Land Use	1978 Acres/ Hectares	1997 Acres/ Hectares	Projected Acres/ Hectares	Area Change 1978/1999 (Acres/Hectares)	Area Change 1997/1999 (Acres/Hectares)
APZ 2					
Military Facility	430/174	474/192	1,042/422	612/248	568/230
Business/Research	89/36	243/98	667/270	578/234	424/172
Industrial	142/57	150/61	435/176	293/119	285/115
Residential	673/272	940/380	1,548/626	875/354	608/246
Conservation	25/10	4/2	53/21	28/11	49/19
Public Facilities	175/71	269/109	333/135	158/64	64/26
Retail	84/34	0/0	155/63	71/29	155/63
Mixed Use	285/115	648/262	621/251	336/136	-27/-11
Total	3,842/1,555	5,434/2,199	8,428/3,411	4,586/1,836	2,994/1,211

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Table 4.4-2

LAND USE AND ACREAGE WITHIN EXISTING (1978 AND 1997) AND PROJECTED (1999) APZs AT NALF FENTRESS

Land Use	1978 Acres/ Hectares	1997 Acres/ Hectares	Projected Acres/ Hectares	Area Change 1978/1999 (Acres/Hectares)	Area Change 1997/1999 (Acres/Hectares)
Clear Zone					
Military Facility	214/87	254/103	254/103	40/16	0/0
Agricultural/Rural Residential	0/0	7/3	7/3	7/3	0/0
Residential	0/0	0/0	0/0	0/0	0/0
Conservation	0/0	0/0	0/0	0/0	0/0
Transition Areas	0/0	0/0	0/0	0/0	0/0
APZ 1					
Military Facility	631/255	758/307	758/307	127/52	0/0
Agricultural/Rural Residential	306/124	585/237	585/237	279/113	0/0
Residential	0/0	66/27	66/27	66/27	0/0
Conservation	116/47	0/0	0/0	-116/-47	0/0
Transition Areas	0/0	0/0	0/0	0/0	0/0
APZ 2					
Military Facility	0/0	80/32	80/32	80/32	0/0
Agricultural/Rural Residential	565/229	2,810/1,137	2,810/1,137	2,245/908	0/0
Residential	0/0	163/66	163/66	163/66	0/0
Conservation	492/199	1,346/545	1,346/545	854/346	0/0
Transition Areas	29/12	0/0	0/0	-29/-12	0/0
Total	2,353/952	6,069/2,456	6,069/2,456	3,716/1,504	0/0

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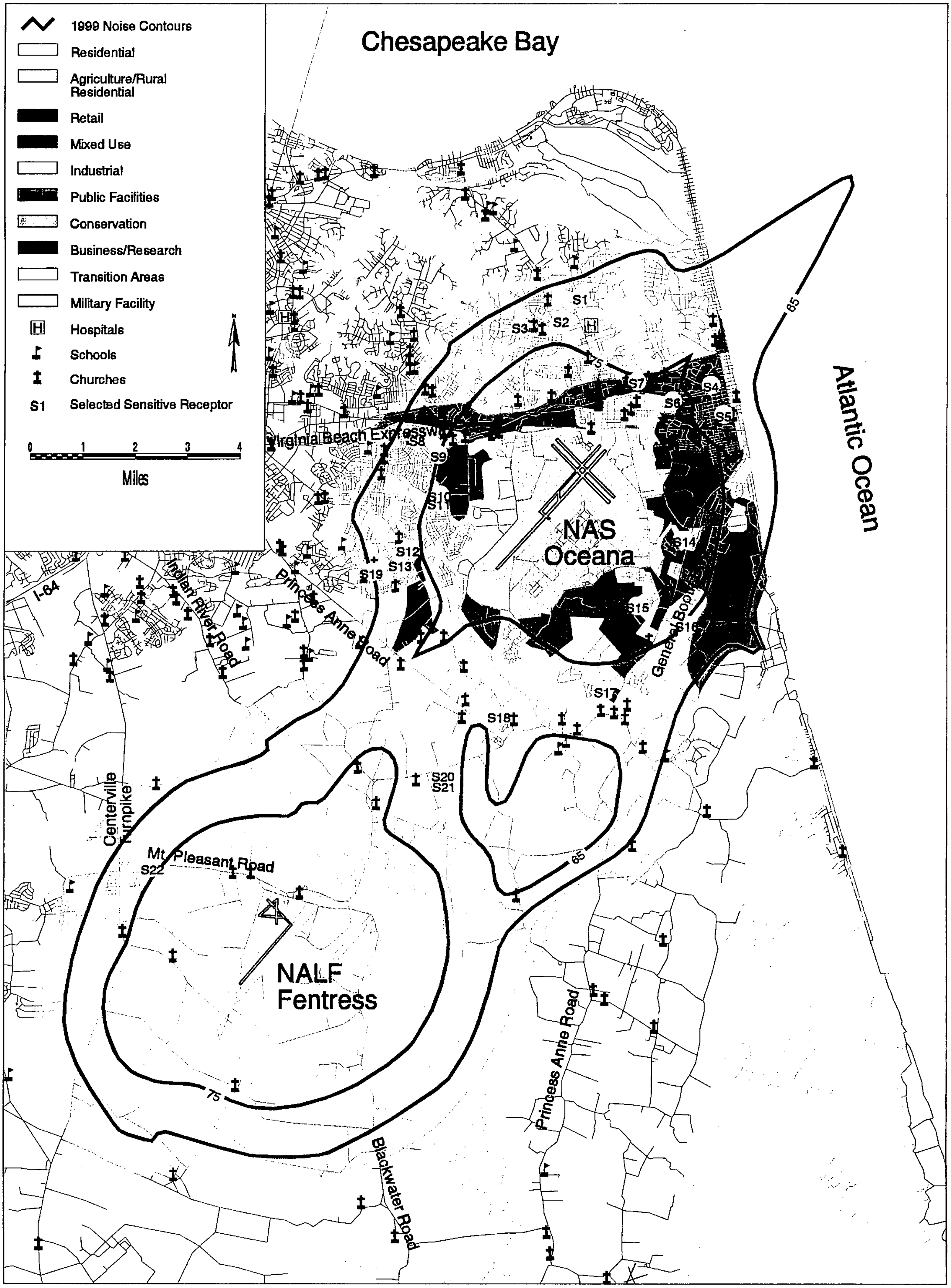
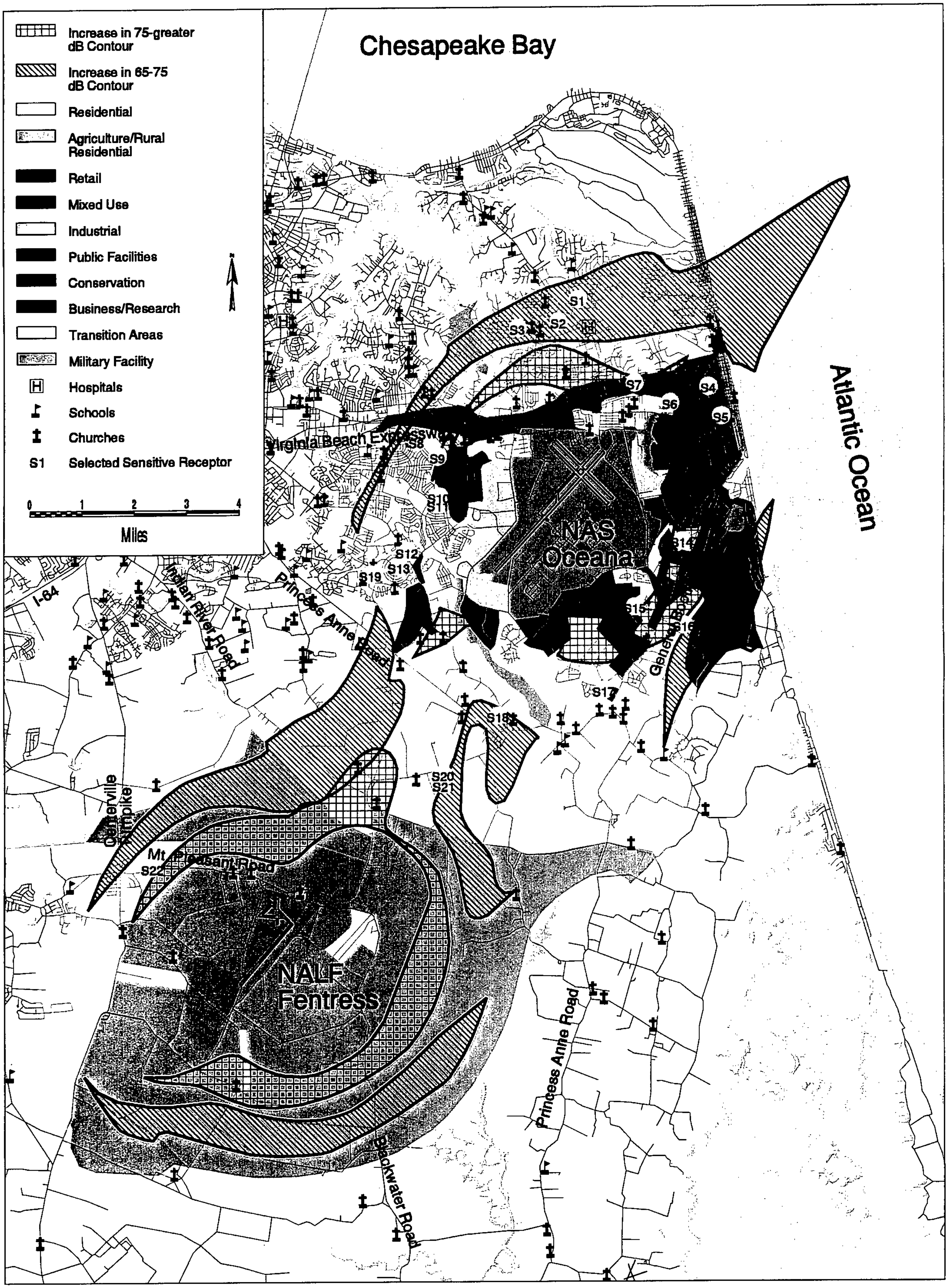


Source: Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

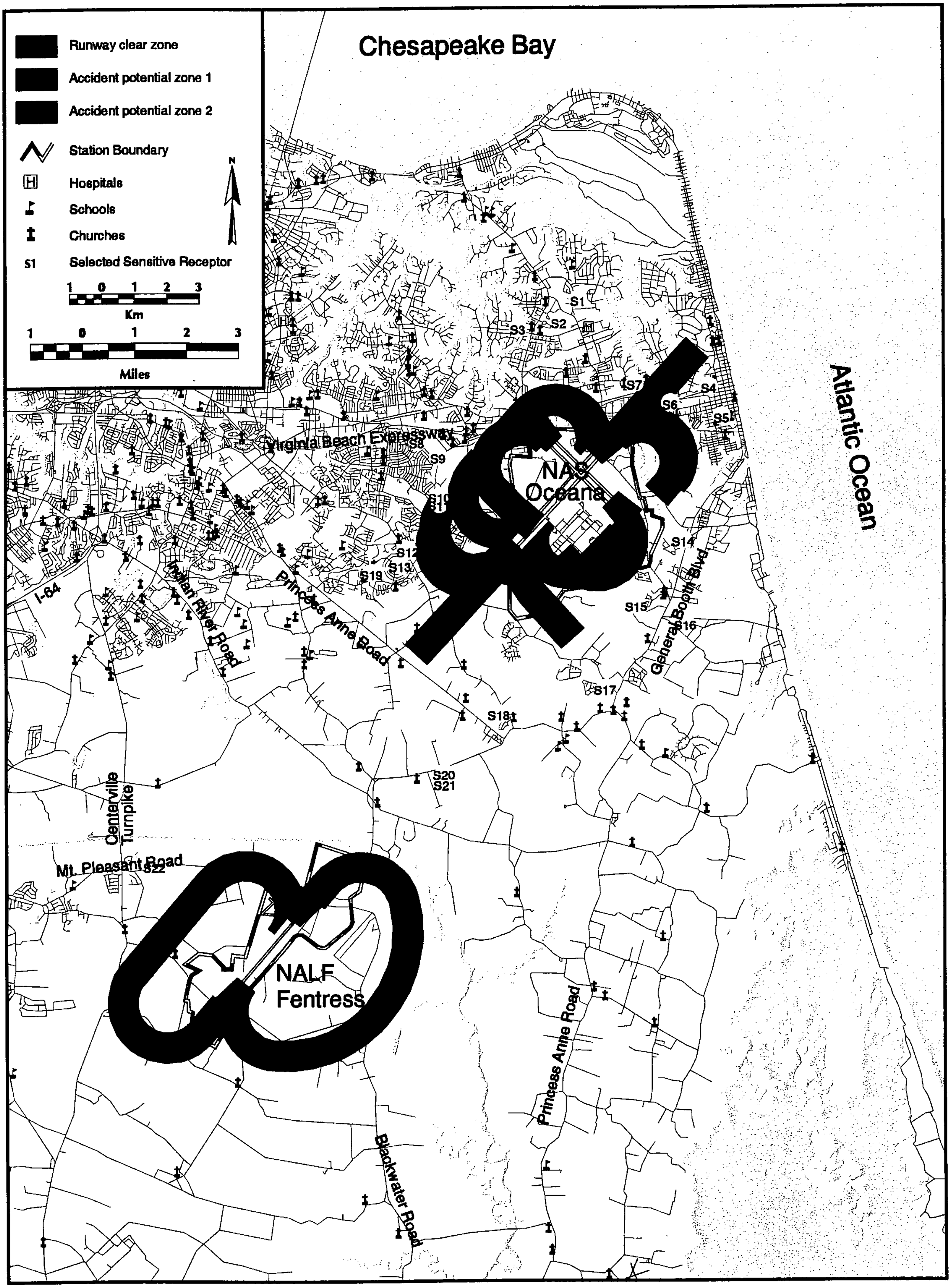
Figure 4.4-1
ARS 1 - Projected 1999 Noise Contours and Land Use
NAS Oceana



Source: U.S. Navy 1978; Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

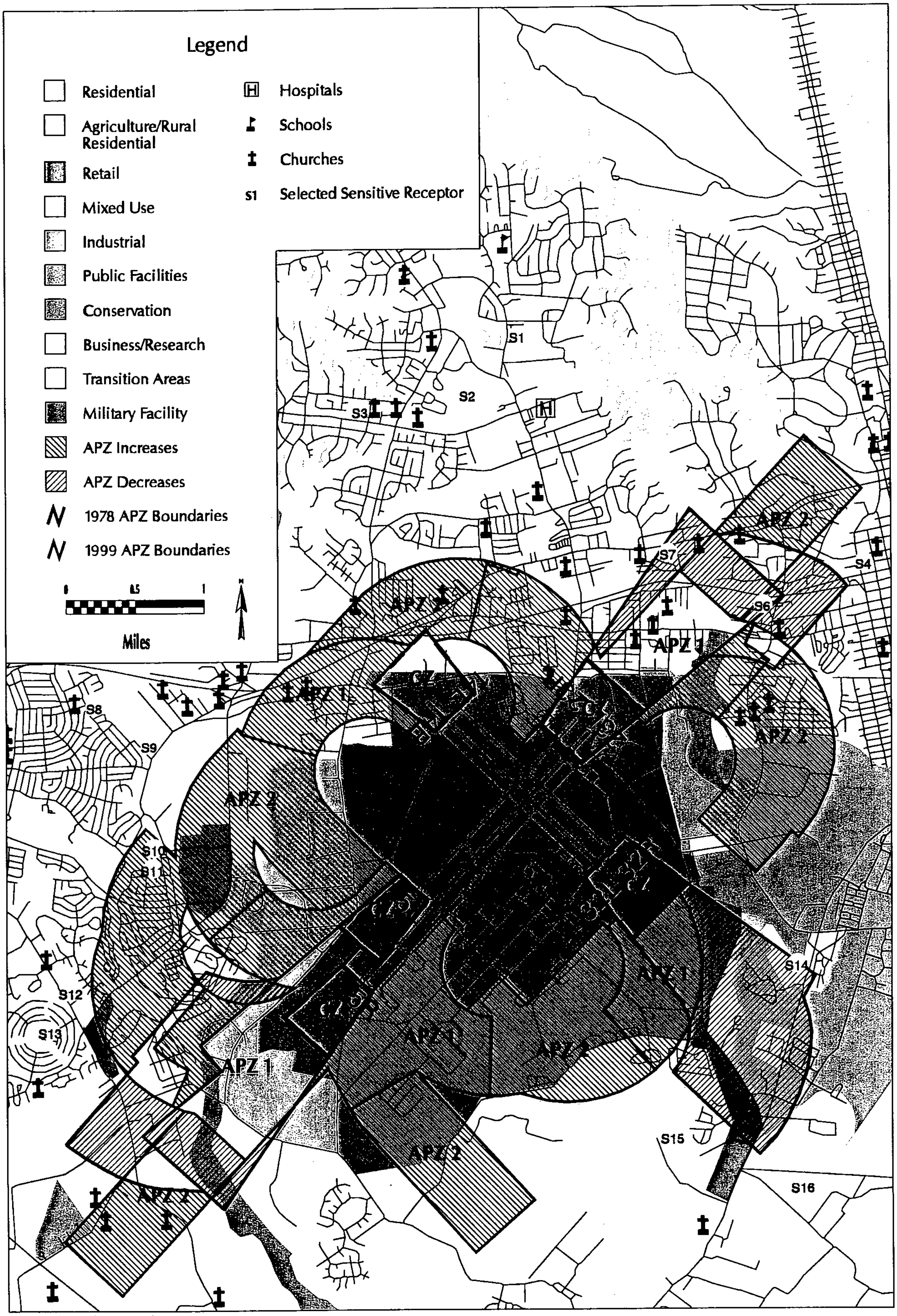
Figure 4.4-2

ARS 1 - Increase between 1978 AICUZ Noise Contours and Projected 1999 Noise Contours and Land Use
NAS Oceana



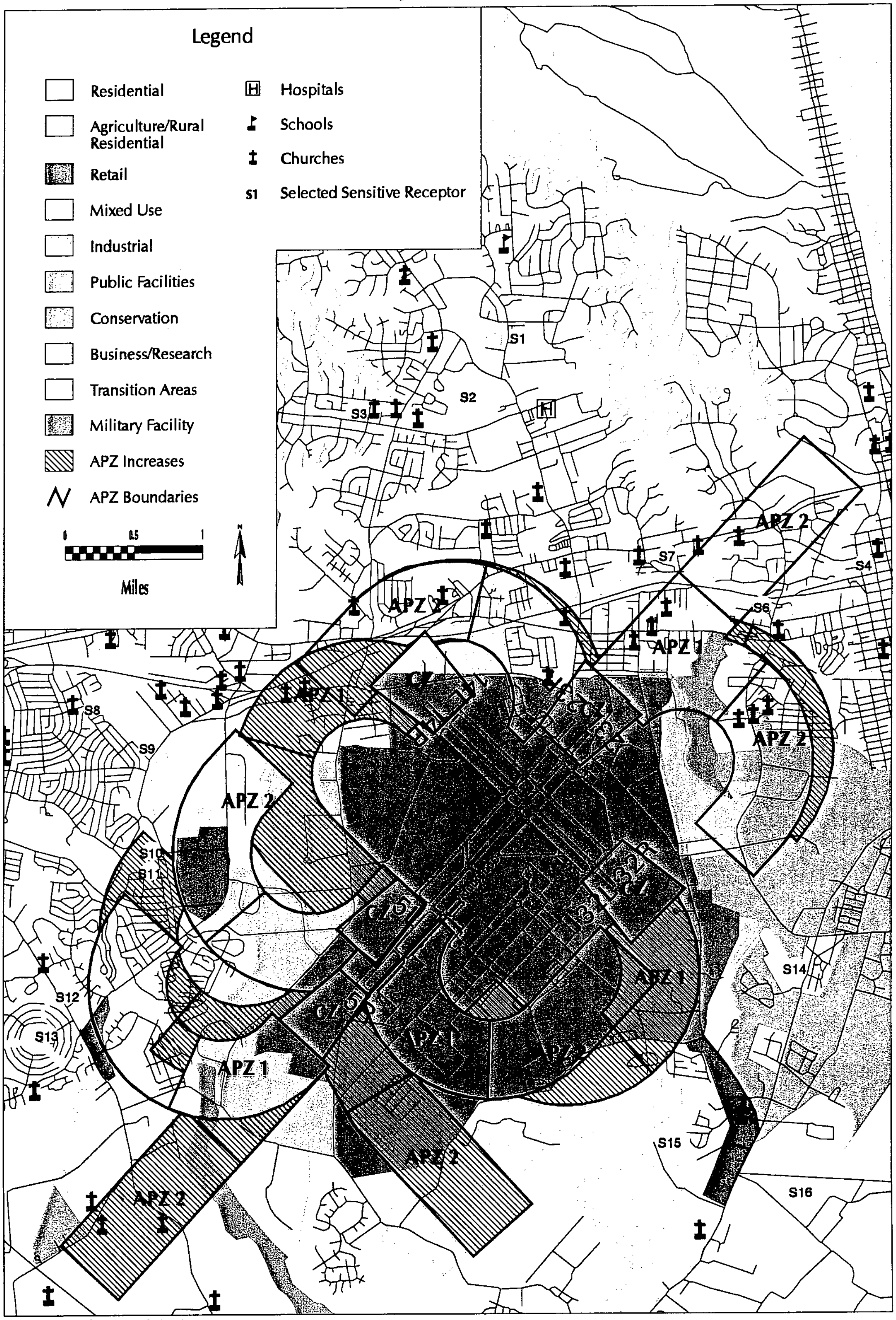
Source: Wyle Labs 1997

Figure 4.4-3
ARS 1 - Projected 1999 APZs
NAS Oceana



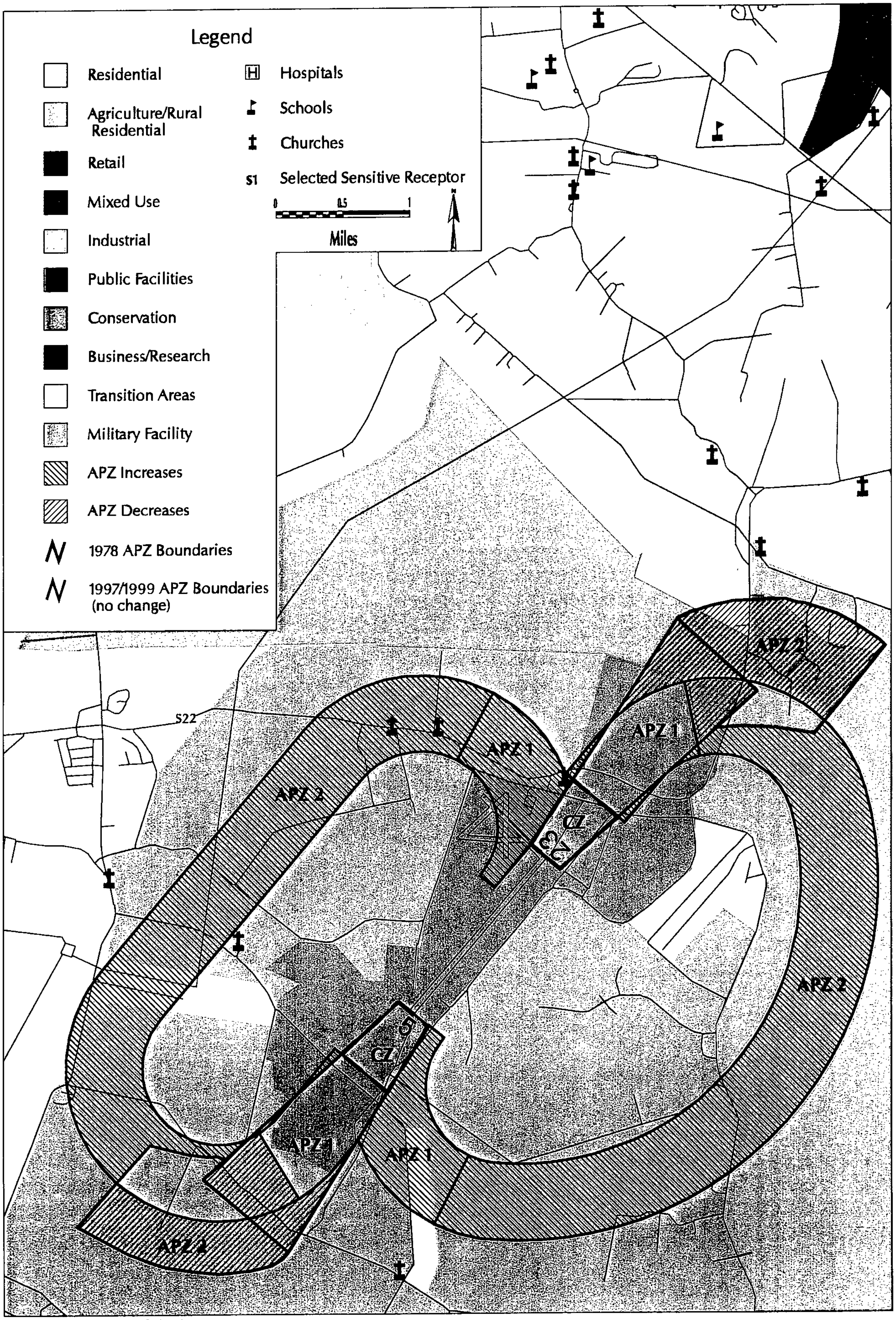
Source: City of VA. Beach 1991
City of Chesapeake 1993
US Navy 1978;Wyle Labs 1997

Figure 4.4-4
ARS 1 - Increase/Decrease between 1978 and Projected 1999 APZs and Land Use
NAS Oceana



Source: City of VA. Beach 1991
City of Chesapeake 1993
Wyle Labs 1997

Figure 4.4-5
ARS 1 - Increase Between Existing 1997 and Projected 1999 APZs and Land Use
NAS Oceana



Source: City of VA. Beach 1991
City of Chesapeake 1993
U.S. Navy 1978;Wyle Labs 1997

Figure 4.4-6
ARS 1 - Increase/Decrease Between 1978 APZs and 1997/1999 APZs and Land Use
NALF Fentress

4.5 Socioeconomics and Community Services

4.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

ARS 1 would result in impacts on the population of NAS Oceana, the city of Virginia Beach, the city of Chesapeake, and the south Hampton Roads region. Relocation of the 11 F/A-18 fleet squadrons and the F/A-18 FRS would result in the transfer of approximately 4,200 positions (580 officers, 3,510 enlisted personnel, and 110 civilians) to NAS Oceana by the end of FY 1999.

However, these impacts would be slightly magnified by other actions planned at the station. Since FY 1996, the A-6 aircraft previously assigned to NAS Oceana have been decommissioned and the supporting A-6 military personnel reassigned. This reduced the total on-station population by approximately 700 personnel. In addition, as a result of separate 1993 and 1995 BRAC mandates, as well as actions separate from BRAC, several F-14 squadrons were relocated to NAS Oceana during FY 1996 and FY 1997. These transfers have resulted in the relocation of approximately 2,100 personnel to NAS Oceana and are not part of the proposed action (U.S. Navy 1995a). The net effect of these changes, coupled with the proposed action, will result in gradual increases in station population through FY 1999 (see Table 4.5-1). Cumulatively, the proposed action and the other planned personnel movements would result in a net increase of approximately 5,600 military and civilian personnel at NAS Oceana over the current personnel loading level of 8,100.

The demographic character of the City of Virginia Beach and south Hampton Roads would be similarly impacted. When various demographic characteristics of these 5,600 additional military and civilian personnel are considered (such as marital status, average number of dependents, and typical household size), the net impact of all the personnel actions occurring at NAS Oceana is expected to increase the regional population by an estimated 12,500 residents, when the additional personnel and their dependents are included (U.S. Navy 1995a). Assuming that the personnel relocating to NAS Oceana would have a geographical distribution similar to civilian personnel currently working on the station, approximately 92.8% of these relocating families would reside in south Hampton Roads. Virginia Beach would receive the majority (74.2%) of these new residents, while Chesapeake (9.3%), Norfolk (5.9%), Portsmouth (2.5%), and Suffolk (0.9%) would account for the remaining people. Based on these assumptions, total population in the City of Virginia Beach is

Table 4.5-1

PROJECTED PERSONNEL LOADINGS AT NAS OCEANA UNDER ARS 1

	FY 1996	FY 1997	FY 1998	FY 1999
Personnel at beginning of FY	8,100	8,800	9,500	12,650
A-6 Decommissioning	-300	-300	NA	NA
A-6 AIMD and ATKWING Support Staff Decommissioning	NA	-100	NA	NA
Realignment of F-14 FRS Detachment[a]	NA	+150	NA	NA
Realignment of F-14 Squadrons[b]	+600	+600	NA	NA
F-14 Support Staff[b]	+400	+50	NA	NA
Transfer of F-14A Squadron[c]	NA	+300	NA	NA
Realignment of F/A-18 Squadrons[d]	NA	NA	+1,740	+1,050
F/A-18 Support Staff			1,410	
End of Fiscal Year	8,800	9,500	12,650	13,700
Net change from beginning of FY 1996	+700	+1,400	+4,550	+5,600

a Result of 1993 BRAC mandates, separate from the proposed action.
b Result of 1995 BRAC mandates, separate from the proposed action.
c Result of non-BRAC action, separate from the proposed action.
d Result of proposed action.

Key:

AIMD = Aircraft Intermediate Maintenance Department.
ATKWING = Attack Wing.
FRS = Fleet Replacement Squadron.
FY = Fiscal Year.
NA = Not applicable

Source: U.S. Navy 1995a.

projected to increase by approximately 9,300 residents; the total population in south Hampton Roads is expected to increase by approximately 11,600 persons (see Table 4.5-2).

Given the size of the City of Virginia Beach and south Hampton Roads as a whole, these net increases in population would have only a minor effect on the demographic characteristics of the areas. The influx of new persons into Virginia Beach would create a 2% increase in the total population of the city over its current levels. Likewise, the additional 11,600 persons in south Hampton Roads would account for an increase of slightly more than 1.2% of the total regional population. Other communities in south Hampton Roads would be even less affected by the proposed realignment under ARS 1.

Economy, Employment, and Income

The proposed relocation of the F/A-18 aircraft to NAS Oceana would have a positive, long-term impact on the economy of the City of Virginia Beach and on the regional economy as a whole. As a net result of the proposed action and other personnel movements occurring at the base, direct Navy employment in the City of Virginia Beach would be expanded by approximately 5,600 additional military and civilian positions over current levels. This net increase in direct Navy employment is expected to inject an additional $226 million annually into the regional economy through increased payroll expenditures (Christiansen 1995).

ARS 1 would also inject funds into the local economy through increased construction and procurement expenditures at NAS Oceana. To accommodate the additional personnel and equipment, the proposed construction and renovation activities would have to take place at NAS Oceana. Total construction and renovation expenses for the proposed realignment is projected to be approximately $94 million. Because a large portion of these funds would be spent on labor and materials purchased in the region, a positive regional economic impact would occur as a result of these expenditures.

As this additional income is injected into the regional economy through changes in NAS Oceana payroll, procurement, and construction expenditures, employment and earnings in the regional economy would be expanded or multiplied. Every additional job created at NAS Oceana and every additional dollar spent on local contractors/suppliers to support the activities relocating to NAS Oceana would stimulate the regional economy and create more employment and business opportunities.

As more personnel are assigned to NAS Oceana, these new employees would spend a portion of their disposable income in the regional economy. As NAS Oceana spends additional money for local contractors, the profits and sales of local merchants and suppliers would increase. These local merchants and suppliers may, in turn, increase employment or

Table 4.5-2

NET REGIONAL SOCIOECONOMIC IMPACTS AT NAS OCEANA RESULTING FROM ARS 1[a]

	Virginia Beach	Chesapeake	Norfolk	Portsmouth	Suffolk	Total South Hampton Roads	Other	Total Effects
Population Impacts								
Total Military and Civilians Relocating	4,160	520	330	140	50	5,200	400	5,600
Number of Military and Civilian Dependents	5,130	640	410	170	60	6,410	490	6,900
Total Population Change	9,290	1,160	740	310	110	11,610	890	12,500
Personnel and Regional Housing Impacts								
Total Officers Relocating	550	70	40	20	10	690	50	740
Total Enlisted Personnel Relocating	3,530	440	280	120	40	4,410	340	4,750
Total Civilians Relocating	80	10	10	0	0	100	10	110
Total Military and Civilian Households Relocating	4,160	520	330	140	50	5,200	400	5,600
Fiscal Impacts								
Total Population Change	9,290	1,160	740	310	110	11,520	890	NA
Local Per Capita Tax Contribution	$1,005	$1,128	$1,048	$883	$842	NA	NA	NA
Estimated Change in Local Tax Contributions	$9,336,450	$1,308,480	$775,520	$273,730	$92,620	$11,786,800	NA	NA
Education Impacts								
Total Elementary School-Aged Children	1,340	170	110	40	20	1,680	130	1,810
Total Middle School-Aged Children	410	50	30	10	10	510	40	550
Total High School-Aged Children	260	30	20	10	0	320	30	350
Total Number of School-Aged Children	2,010	250	160	60	30	2,510	200	2,710

Note: Totals may not add due to rounding.

[a] Includes relocations for ARS 1 and other relocations occurring at NAS Oceana.

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increase output as a direct result of the additional demand for their goods and services. Thus, the positive economic impacts of the original injections of funds would be cycled back into the economy, repeating or multiplying the effect.

Using the Regional Input-Output Model (RIMS II), which was designed by the U.S. Bureau of Economic Analysis, it is possible to quantify the total (both the direct and indirect) effects of the injection of these additional construction expenditures. The increase of approximately $94 million in construction contracts would support an estimated 1,190 additional jobs and generate approximately $28.2 million in employee earnings (see Table 4.5-3) (U.S. Bureau of Economic Analysis 1995). When the indirect effects of the increase in NAS Oceana's payroll are included, the positive economic impacts of the proposed personnel movements would be even greater.

Table 4.5-3

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF 11 F/A-18 SQUADRONS AND THE F/A-18 FLEET REPLACEMENT SQUADRON TO NAS OCEANA UNDER ARS 1

Impacts	
Direct Economic Impacts	
Increase in military and civilian payroll	$225,800,000
Construction expenditures	$93,500,000
Total	$319,300,000
Indirect Economic Impacts[a]	
Change in employee earnings	$28,200,000
Employment impacts (jobs)	1,190

[a] Indirect economic impacts have only been calculated for construction expenditures.

However, because these construction funds represent only a one-time expenditure, the resulting positive economic impacts would only be of a short duration. Once these funds leave the regional economy through leakages such as savings, taxes, or purchases of goods and services from outside the region, the positive effects would no longer be multiplied.

Housing

The proposed realignment of F/A-18 aircraft to NAS Oceana under ARS 1 would significantly impact the demand for on-station military housing. All military-controlled

housing would experience an increase in demand, but BEQs are expected to be most affected. Current Navy Policy is to house EI-E4 personnel on-station and provide limited on-station housing for E-5 and above personnel. Therefore, the majority of E-5 and above personnel would reside in the local community. As of May 1997, NAS Oceana can accommodate approximately 1,800 personnel in existing BEQs. The proposed realignment would require approximately 3,360 personnel to be accommodated in BEQs. Therefore, the combination of existing adequate BEQ spaces and the planned BEQ to house 460 personnel (E1-E4) would not be sufficient to accommodate all the additional personnel. A shortfall of approximately 1,100 BEQ spaces would be expected.

To mitigate the anticipated shortfall of BEQ facilities in the short term, NAS Oceana will take the following measures:

- Place priority on providing housing for lower ranks in existing BEQ facilities; and
- Require persons in higher ranks displaced from BEQ facilities to seek housing in the private economy, given the supply in the regional market and their ability to afford current regional housing costs.

The demand for BOQs would also increase as a result of the proposed realignment. However, because of the relatively few officers transferring and the low number of officers who would prefer to reside on-station rather than in the local community, existing BOQ capacity is anticipated to be more than adequate to handle the additional demand for on-station bachelor officer housing (Harnitchek 1995). Therefore, the proposed realignment would not significantly affect the supply of BOQs at NAS Oceana.

Similarly, the proposed realignment of F/A-18 aircraft and other planned personnel movements at NAS Oceana would increase the demand for Navy family housing units at NAS Oceana and throughout the south Hampton Roads area. According to the FY 98 family housing survey, approximately 49,000 military personnel were eligible for Navy family housing in 1996. Existing military-controlled housing as well as suitable private housing were deemed to be generally sufficient to handle this population. By contrast, it has been projected that the number of families eligible for Navy family housing will decrease to approximately 46,000 families by the year 2001. This figure includes families that would be relocated from NAS Cecil Field. During the same time approximately 1,000 additional Navy family housing units are expected to be available in the area. As a result of the decrease in military population from downsizing activities and the increase in military controlled housing, the overall Navy demand for off-base housing will actually decrease (LANTDIV 1997d).

Using assumptions similar to those utilized by the Navy to forecast the demand for family housing units, the proposed realignment of F/A-18 aircraft squadrons under ARS 1 is not anticipated to exceed the capacity of suitable family housing units in the region. Assuming a housing requirements factor of 60.0% and that 10.5% of the Navy families involved would choose voluntary separation, approximately 3,000 households relocating from NAS Cecil Field would require family housing (U.S. Navy 1994a). Given the size and nature of the south Hampton Roads housing market, this projected demand could be accommodated by the local economy. As noted before, even with the additional 3,000 households, the total Navy demand for family housing will decrease. Therefore, the provision of Navy family housing is not expected to be negatively impacted by the proposed personnel movements.

The combined increase in bachelor and family households in the area is expected to have only a minor impact on the regional housing market. Table 4.5-2 shows the projected change in the number of households in each city in the region based on the existing geographical distribution of base personnel. The net impact of the proposed action is expected to increase the total population in the City of Virginia Beach by approximately 4,200 households and the City of Chesapeake by more than 500 households.

Assuming each household requires one housing unit, the net effect of the proposed realignment and other planned personnel movements would increase the demand for housing in the City of Virginia Beach by approximately 4,200 units and the City of Chesapeake by 500 units. Based on the large number of housing units located in Virginia Beach (147,037 units) and in Chesapeake (55,742 units), the projected increase in demand for approximately 4,200 and 500 units, respectively, would not significantly impact the regional housing market. Considering homeowner and rental vacancy rates in the region (which range between 4.0% and 8.1% in Virginia Beach and between 3.4% and 9.0% in Chesapeake), the increase in the quantity of housing demanded would be so small that it would only slightly impact the housing supply and the market price of these units.

Taxes and Revenues

The relocation of personnel to NAS Oceana would have a positive impact on the generation of tax revenues for the City of Virginia Beach, south Hampton Roads, and the Commonwealth of Virginia as a whole. Because the majority of the relocating personnel currently reside outside of Virginia, any taxes these individuals pay would represent a net increase in revenues for the commonwealth. Sales tax receipts and corporate income tax receipts would also increase as a direct result of the expanded regional economy.

As described previously, the transfer of F/A-18 aircraft to NAS Oceana would result in a net increase of approximately 9,300 residents in Virginia Beach. Local government revenue generated annually by these additional residents would be approximately $9,336,000. This estimate assumes that the local per capita tax contribution will remain constant at $1,005 per resident. See Table 4.5-2 for the fiscal impacts to all cities in south Hampton Roads.

The additional residents would cause the demand for community services and facilities to increase in Virginia Beach and in other communities in the region, and cause an increase in the cities' total expenditures. In particular, the increase in school-age military dependents would lead to an increase in the total school expenditures. Districts that would be significantly impacted by the increase in federally-connected students may receive additional impact aid from the U.S. Department of Education. This would cover a portion of the average costs per student.

Because the majority of the relocating families are expected to live on private property in the surrounding communities, property taxes levied on these residences would help offset the increase in costs to the local governments.

Because the Navy spends additional funds on construction activities and procurement expenditures, the total amount of economic activity in the region would increase. As a result, additional employment, employee earnings, sales receipts, and economic output would all expand, leading to an increase in tax revenues.

As a result of all of these factors, Virginia Beach and the other communities in the region would not experience any significant negative fiscal impacts from the proposed realignment under ARS 1.

4.5.2 Community Services

Fire and Emergency Services

Fire protection services on the station would not be adversely affected by the proposed realignment activities under ARS 1. Current staffing and equipment levels should be sufficient to accommodate any increase in the demand for fire protection services at NAS Oceana.

The population increase in Virginia Beach is not anticipated to have a significant impact on the provision of fire and emergency services in the city. Because the net change of 9,300 residents would account for an increase of only 2.0% in the city's population, any impacts to the fire department are expected to be relatively minimal. In 1990, Virginia Beach had approximately 1.3 fire fighters and 1.6 rescue personnel per 1,000 residents (City of

Virginia Beach 1991). Upon completion of the proposed realignment and other planned personnel movements, these figures would be expected to remain at 1.3 fire fighters and 1.6 emergency personnel per 1,000 residents, indicating no change in the level of service provided to Virginia Beach residents.

Likewise, the increase of approximately 1,160 additional residents in Chesapeake is not anticipated to have a significant impact on the provision of fire and emergency services in the city. The City of Chesapeake has approximately 1.6 uniformed fire fighters per 1,000 residents. After completion of the proposed realignment this ratio would remain at 1.6 uniformed personnel per 1,000 residents, indicating no change in the level of service provided to the Chesapeake residents.

Security Services

The increase in military and civilian personnel stationed at NAS Oceana would only slightly increase the demands placed on existing security services. These could be accommodated using existing station resources.

The relocation of the F/A-18 aircraft squadrons and other personnel movements occurring at NAS Oceana are not expected to significantly impact the ability of Virginia Beach or Chesapeake to provide adequate police protection to their residents. Virginia Beach has approximately 1.5 police officers per 1,000 residents, and Chesapeake has 1.6 police officers per 1,000 residents (City of Virginia Beach 1991; City of Chesapeake 1990). These ratios are not expected to change as a result of the projected influx of residents to either city, indicating no change in the level of service to either city.

Medical Services

The proposed realignment of F/A-18 squadrons under ARS 1 would not significantly increase the provision of medical services at the station. The proposed addition to the Medical Clinic would allow the facility to provide adequate health care to the relocated personnel and dependents.

Recreational Facilities

The projected increase in NAS Oceana personnel loading under ARS 1 would increase the demand for recreational facilities at the station. Based on the size and capacity of existing MWR facilities, this additional demand should not adversely impact the provision of

on-station recreational services. Upon completion of the proposed realignment, the personnel loading at NAS Oceana would not exceed the design capacity of these facilities (Lytle 1995).

Education

The proposed realignment of F/A-18 squadrons to NAS Oceana under ARS 1, in conjunction with the other planned realignments and decommissioning occurring at the base, are expected to bring approximately an additional 2,700 school-age children into the region (U.S. Navy 1995d). Assuming that 74.2% of these children would live in Virginia Beach, approximately 2,010 additional school-age children would enter the Virginia Beach Public School District, and approximately 250 additional students would enter the Chesapeake Public School District by the end of FY 1999. Most of these children are expected to attend elementary schools (see Table 4.5-2).

Potential impacts would be partly mitigated by the relative size of the district. An increase of approximately 2,010 students represents a 2.7% increase over Virginia Beach's existing enrollment levels, and an increase of 250 students represents only a 0.8% increase over Chesapeake's current enrollment levels.

Virginia Beach would experience the greatest impact as a result of the proposed realignment. However, due to an aggressive capital expansion program currently planned by the Virginia Beach School District, the school system should have sufficient capacity to accommodate the additional 2,010 children. In recent years, the Virginia Beach Public School District has experienced rapid growth in school enrollment and has accommodated 1,000 to 1,800 additional students each year (Lumpkin 1995).

4.6 Infrastructure and Utilities

4.6.1 Water Supply

ARS 1 would result in a net increase of approximately 5,600 personnel at NAS Oceana by the end of 1999. For the purpose of estimating the change in water consumption at NAS Oceana, it is expected that approximately 990 of these persons will reside on base.

According to personnel at NAS Oceana, daily water usage is roughly 0.65 MGD at the station. The station's water distribution and treatment system has the capacity to provide 1.3 MGD (Ryan 1996). Therefore, excess water capacity is 0.65 MGD. If it is expected that 990 additional military persons will live on station, and a daily water usage of 80 gallons per person is assumed, the station's water demand will increase by an additional 0.08 MGD. Additionally, during an average work day, personnel assigned to NAS Oceana use an estimated 30 gallons of water per person. By multiplying this number by the net increase of 5,600 personnel by the end of 1999, the daily increase in water consumption is expected to be 0.17 MGD. Therefore, the net increase in water usage at NAS Oceana from the proposed realignment is expected to reach 0.25 MGD by the end of FY 1999.

With dependents, the net increase of 5,600 personnel transferred to NAS Oceana would result in an estimated total increase of 11,610 persons to south Hampton Roads. Based on existing demographic data, approximately 9,290 persons would reside within the City of Virginia Beach and 1,160 would reside within the City of Chesapeake. The remaining persons are expected to be distributed among other local municipalities in the region.

According to the City of Virginia Beach, gross water use is 90 GPD per person under nonrestrictive water flow conditions (Leahy 1996). By multiplying the number of persons expected to reside in, and receive water from, the City of Virginia Beach by the gross water use per person, a daily increase in water consumption would be 0.836 MGD by the end of FY 1999. Although the city's distribution system has adequate capacity, an increase in water quantity demand would strain the water system, which is already operating under water flow restrictions (Leahy 1996). This water supply problem should be resolved by the Spring of 1998 with the completion of the city's new water treatment facility and the completion of the Lake Gaston Project (see Section 3.1.6).

According to a representative of the City of Chesapeake, gross water usage is 69 GPD per person (Sanders 1996). Assuming that an additional 1,160 persons would reside in Chesapeake by the end of FY 1999, the daily increase in water usage would be 0.08 MGD. The City of Chesapeake supplies water to its population through three different water systems: the West District System, which has a capacity to provide 3.0 MGD per day with an available

capacity of roughly 0.15 MGD; the Indian River/South Norfolk District System, which has a capacity of 2.75 MGD with no available capacity; and the Northwest River District System, which has a capacity of 10 MGD with an available capacity of roughly 3.00 to 3.50 MGD. According to a representative of the City of Chesapeake, the city would be able to meet the additional water demand as a result of the realignment. However, combined with a yearly immigration of approximately 2,000 persons, the situation might be critical in certain districts (Hoddinott 1996).

As with the City of Virginia Beach, Chesapeake's water supply issues should be resolved by a combination of projects currently scheduled, such as completion of the Lake Gaston Project, an increase in water supply derived from Portsmouth, and completion of the city's new treatment plant along the Northwest River.

4.6.2 Wastewater System

As stated in Section 3.1.6.2, regional wastewater is treated by the Hampton Roads Sanitation District (HRSD), which constructs, operates, and maintains the system's major sewage treatment plants, pump stations, and sewer mains. NAS Oceana does not have a wastewater treatment plant, but the station is responsible for developing/maintaining its wastewater conveyance system.

Treatment plants in the vicinity of NAS Oceana have a combined available capacity of 23 MGD. Assuming that wastewater generated equals 80% of the water consumed (ICMA 1988), approximately 0.20 MGD of additional wastewater would be generated and approximately 0.669 MGD would be generated off station. Therefore, HRSD treatment plants would have sufficient capacity to efficiently and effectively process the wastewater generated by the realignment of personnel and dependents to the Hampton Roads District.

As previously stated, NAS Oceana is responsible for the operational capacity of its wastewater conveyance system. The system is in good condition and improvement projects were recently completed (Ryan 1996). Thus, the on-station conveyance system would be adequate for handling the additional loads generated as a result of ARS 1.

The station's HRSD permit will require modification for any change (e.g., increase, decrease, type, location) in the industrial wastewater which is generated on station and eventually treated by HRSD (Aydlett 1996).

4.6.3 Stormwater

Because ARS 1 would include the disturbance of 5.0 or more total acres (2 hectares) of land, an amendment to the station's VPDES permit will be required for the construction

phase of the project. The proposed action would also result in new impermeable surfaces, thereby increasing the amount of surface water runoff. Controls for surface water runoff have been incorporated into the design of each new construction project, as necessary. Storm drains will be equipped with oil separators where there is a potential for petroleum-based products to enter the stormwater drainage system (Kirk 1996).

Because the proposed projects under ARS 1 would be located south of the crosswind runways, stormwater runoff would be directed southward through a series of drainage ditches and containment booms. Once clear of the booms, the majority of the additional stormwater runoff would be discharged through an outfall into West Neck Creek. In accordance with the requirements of Virginia's Stormwater Management Act, the postdevelopment runoff rates for the two-year and 10-year storm would not exceed the respective predevelopment rates for the station as a whole.

4.6.4 Electrical

As stated in Section 3.1.6.4, the Virginia Power Company supplies electric power through a 34.5-kV line that breaks into three separate 34.5-kV lines at a switching station on Harpers Road. With the recently completed electric upgrades throughout the station, no difficulties in supplying electrical service to any of the needed facilities under ARS 1 would occur (Ryan 1996).

4.6.5 Heating

Steam heat is supplied to Building Nos. 401, 240, 513, 137, and 140 from the boiler plant in Building 601 through a system of aboveground and underground steam lines. According to personnel at NAS Oceana, steam heat would be extended to the additions proposed for these buildings as well as to new facilities proposed. The integrity of the boiler plant and distribution system is good, and there is available capacity to service needed projects under ARS 1 (Ryan 1996).

4.6.6 Jet Fuel

As stated in Section 3.1.6, the on-station jet fuel distribution system is being upgraded with the installation of new fuel tanks. Once the system is upgraded, the overall increase in jet fuel demand associated with ARS 1 would not exceed the system's capacity.

4.6.7 Solid Waste

Based on the size of the regional landfill facilities and the relatively small increase projected for solid waste generation, the proposed realignment is not expected to significantly impact the regional landfill capacity (Vanetta 1995).

4.7 Transportation

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 1. ARS 1 would cause an increase in the station's current population, and some segments of Oceana Boulevard would continue to operate at LOS F. Oceana Boulevard, from Bells to Princess Anne, would degrade from LOS E to F, which would be considered a significant impact. Commonwealth of Virginia and the City of Virginia Beach have planned several roadway improvements in the area surrounding the station in response to projected population growth in the region. Completion of these projects would reduce the traffic effects of ARS 1.

Table 4.7-1 presents projected gate volumes for 1999, following the realignment of F/A-18 aircraft to the station under ARS 1. Approximately 7,000 new trips would be generated by NAS Oceana personnel. Using the HRPDC 2015 projections for regional road segments (HRPDC 1995c), the projected ARS 1 traffic was added and distributed over the road network surrounding the station. It should be noted that HRPDC 2015 segment projections assume completion of planned roadway improvements.

Table 4.7-1

PROJECTED GATE VOLUMES FOLLOWING REALIGNMENT AT NAS OCEANA - ARS 1

	Volume
NAS Oceana Personnel	13,700
Total Gate Traffic Volumes	46,873
Front Gate Traffic Volumes	25,388
Entering	12,685
Leaving	12,703
Back Gate Traffic Volumes	21,485
Entering	14,343
Leaving	7,142

Sources: Reppert 1995b.

Table 4.7-2 compares projected traffic loadings and levels of service (LOS) resulting from new traffic associated with ARS 1 to traffic conditions without traffic from the proposed realignment. Discussions of the implications of these projections are provided below.

Table 4.7-2

PROJECTED TRAFFIC CONDITIONS UNDER ARS 1
FOLLOWING REALIGNMENT AT NAS OCEANA
(Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Princess Anne Road (on base)	21,379	C	25,322	D	3,943
Princess Anne Road (on base)- NASO Main Gate to Oceana Blvd.	13,745	C	17,688	C	3,943
London Bridge Road (on base)	9,591	C	13,292	C	3,701
Harpers Road - Dam Neck to London Bridge	2,295	C	2,477	C	182
Oceana Boulevard - Virginia Beach Blvd. to Bells	23,070	D	24,104	D	1,034
Oceana Boulevard - Bells to Princess Anne (NASO)	29,017	E	30,427	F	1,410
Oceana Boulevard - Princess Anne (NASO) to Harpers	30,227	F	30,365	F	138
Oceana Boulevard - Harpers to Flicker Way	27,862	F	27,965	F	103
Oceana Boulevard - Flicker Way to General Booth	42,876	F	42,951	F	75
First Colonial Road - Base Boundary to Indiana Avenue	1,737	C	1,745	C	8
First Colonial - Indiana to Virginia Beach Blvd.	14,788	C	15,256	C	468
First Colonial - Virginia Beach Boulevard to Expressway	25,808	D	25,858	D	50
London Bridge Road - Swamp Rd. to Shipps Corner	15,184	F	15,480	F	296
London Bridge Road - Shipps Corner to Crusader Circle	27,284	F	27,340	F	56
London Bridge Road - Crusader Circle to International Parkway	23,949	F	24,000	F	51
Virginia Beach Blvd. - Lynnhaven to Great Neck Road	23,560	B	24,032	B	472

Key at end of table.

Table 4.7-2

PROJECTED TRAFFIC CONDITIONS UNDER ARS 1
FOLLOWING REALIGNMENT AT NAS OCEANA
(Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Virginia Beach Blvd. - London Bridge Rd. to Chapel Lake	22,961	B	23,433	B	472
Virginia Beach Blvd. - Chapel Lake to Fountain Dr.	3,826	B	4,460	B	634
Virginia Beach Blvd. - Fountain Dr. to First Colonial	4,307	B	5,747	B	1,440
Virginia Beach Blvd. - First Colonial to Oceana	13,306	C	15,118	D	1,812
Virginia Beach Blvd. - Oceana to Shipps Ln.	3,828	B	5,232	B	1,404
Virginia Beach Blvd. - Shipps Ln. to Birdneck	22,970	B	23,771	B	801
Virginia Beach/Norfolk Expressway (SR44) - Lynnhaven to Great Neck	66,882	C	67,404	C	522
Virginia Beach/Norfolk Expressway (SR44) - Great Neck to First Colonial	40,383	B	40,905	B	522
Virginia Beach/Norfolk Expressway (SR44) - First Colonial to Birdneck	44,253	B	44,644	B	391
Laskin Road - Great Neck to Victor Cr.	45,927	F	46,097	F	170
Laskin Road - Victor Cr. to First Colonial	48,234	F	48,818	F	584
Laskin Road - First Colonial to Birdneck Rd.	22,649	B	23,041	B	392
Bells Road - Birdneck to Oceana Blvd.	7,963	C	8,464	C	501
Birdneck Road - General Booth to Bells	8,274	C	8,508	C	234
Birdneck Road - Bells to Owl's Creek	12,205	D	12,439	D	234

Key at end of table.

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Table 4.7-2 (Cont.)

Note: LOS based on Generalized Annual Average Daily Volumes for Area's Transitioning into urbanized areas as established in Level of Service Standards and Guidelines Manual for Planning (Florida Department of Transportation 1995).

Key:

A = Free-flow conditions.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds, however low maneuverability.
E = Traffic at capacity of segment; unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
NASO = Naval Air Station Oceana.

Source: HRPDC 1995c.

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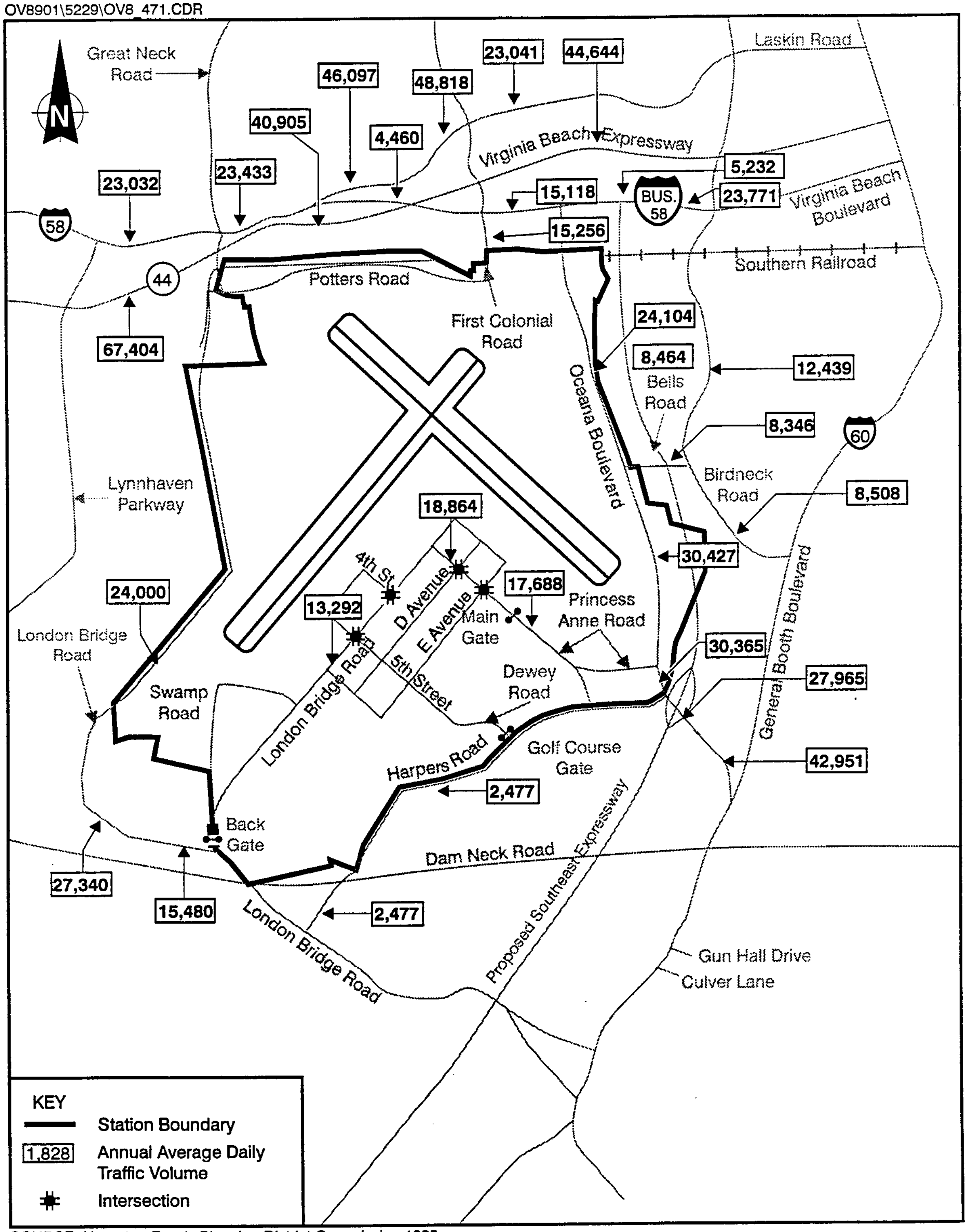

SOURCE: Hampton Roads Planning District Commission 1995c

SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 4.7-1 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING NAS OCEANA FOLLOWING REALIGNMENT UNDER ARS 1

4.7.1 Regional Road Network

Roads in the region would experience increases in daily traffic as a result of ARS 1. Virginia Beach Boulevard would drop from LOS C to D with the implementation of ARS 1. In addition, Oceana Boulevard, from Bells to Princess Anne, would degrade from LOS E to F. Some other roadway segments along Oceana Boulevard would continue to operate at less than optimum LOSs (i.e., LOS of D, E, or F). Although ARS 1 would result in additional traffic on these thoroughfares, actual impact on transportation would be, in most cases, negligible because the influx of traffic would be small relative to the existing traffic flows.

Approved and planned roadway improvements on currently congested roadways (see Table 3.1-21) and personnel reductions associated with the decommissioning of A-6 squadrons would reduce the impact. Furthermore, planned roadway improvements, specifically the expansion of Oceana Boulevard, would provide additional capacity on the regional transportation network.

4.7.2 Station Road Network

Internal roads at the station would be more significantly impacted by the proposed realignment under ARS 1. One segment of Princess Anne Road would deteriorate from an LOS of C to D. This is primarily due to the narrower road width along this segment of the road. Other on-station roads are also expected to experience increases in traffic. In addition, as discussed in Section 3.1.7, PWC Norfolk conducted LOS analyses at various key on-station intersections (see Figure 4.7-1). As a result of increased volumes, these intersections would experience deterioration in LOS, primarily during the evening peak hours. For example, combined evening peak hour LOSs for intersections along Princess Anne and London Bridge roads would drop to E or F, representing conditions where turning movements are severely constrained.

These on-station impacts would be mitigated by various site-specific improvements, such as widening of portions of Princess Anne and London Bridge roads, as well as improved signage and possible signalization of key intersections if warranted. These measures would be conducted as part of future capital improvement programming at NAS Oceana.

4.7.3 Planned Road Improvements

Traffic projected as a result of ARS 1 would not affect the viability or reasonableness of any planned road improvement in the area surrounding the station.

4.8 Noise

Noise exposure levels in the region would significantly increase as a result of aircraft operations associated with ARS 1.

The Navy has conducted an aircraft noise study to examine the impacts resulting from operations of the incoming Atlantic Fleet F/A-18 aircraft (Wyle Labs 1997). As with previous noise studies conducted at the station, this study involved the use of DoD's NOISEMAP model to project AAD Ldn contours in 1999, when realignment at the station would be completed. A discussion of NOISEMAP and Ldn is provided in Section 3.1.8.

At NALF Fentress, the projected 1999 contours also include operations of aircraft stationed at NAS Norfolk that use NALF Fentress for training activities.

Inputs into the NOISEMAP model included:

- Projected flight operations by aircraft type, generated in the airfield and airspace operational study for the proposed action (ATAC 1997) (see Section 4.1);
- Distribution of flight operations to runways and flight tracks at and between NAS Oceana and NALF Fentress;
- Estimates of flight profiles, run-up times, and engine thrust settings derived from interviews with NAS Oceana and NAS Cecil Field personnel; and
- Estimates of in-aircraft and test cell engine maintenance run-up activity derived from NAS Oceana and NAS Cecil Field testing logs (Wyle Labs 1997).

Figure 4.8-1 depicts projected 1999 AAD noise contours for ARS 1, compared to existing 1978 AICUZ noise contours, and new areas that would be exposed within the associated noise contours (i.e., 65 to 75 dB and 75 dB and greater). As shown, both levels of noise exposure would cover larger areas than their respective AICUZ noise contours. As shown in Table 4.8-1, there would be a significant increase in aircraft noise exposure under ARS 1 compared with the 1978 AICUZ and 1997 noise contours. Table 4.8-2 presents the projected decrease in area and population noise exposure relative to 1978 AICUZ. The projected 65 to 75 dB noise contour for ARS 1 would cover an area of approximately 34,623 acres (14,012 hectares), with an estimated population of 78,687 people. The 75 dB or greater

Table 4.8-1

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1978 AICUZ, EXISTING 1997, AND PROJECTED 1999 NOISE CONTOURS NAS OCEANA/NALF FENTRESS - ARS 1

Ldn	1978 AICUZ		1997 Noise Contours		1999 Noise Contours		New Area/Population Exposed Relative to 1978 AICUZ[a]	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	31,214 (12,632)	66,123	13,293 (5,379)	33,545	34,623 (14,012)	78,687	13,821 (5,593)	22,875
75 dB or greater	20,361 (8,240)	42,445	4,949 (2,002)	1,295	28,191 (11,409)	51,544	8,443 (3,417)	16,108
Total	51,575 (20,872)	108,568	18,242 (7,382)	34,840	62,814 (25,420)	130,231	22,264 (9,010)	38,983

Note: Numbers exclude water areas.

[a] Represents only new area/population that previously were not exposed to listed noise levels under 1978 AICUZ. Does not equal the difference between 1978 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.

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Table 4.8-2 DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE RELATIVE TO 1978 AICUZ NAS OCEANA/NALF FENTRESS-ARS 1		
Reduction in Ldn	**Area in Acres (Hectares)**	**Estimated Population**
75+ to 65 - 75 dB	-1,384 (-560)	-8,350
65 - 75 to <65 dB	-3,088 (-1,250)	-1,995
Total	-4,472 (-1,810)	-10,345

Note: Numbers exclude water areas.

Key:

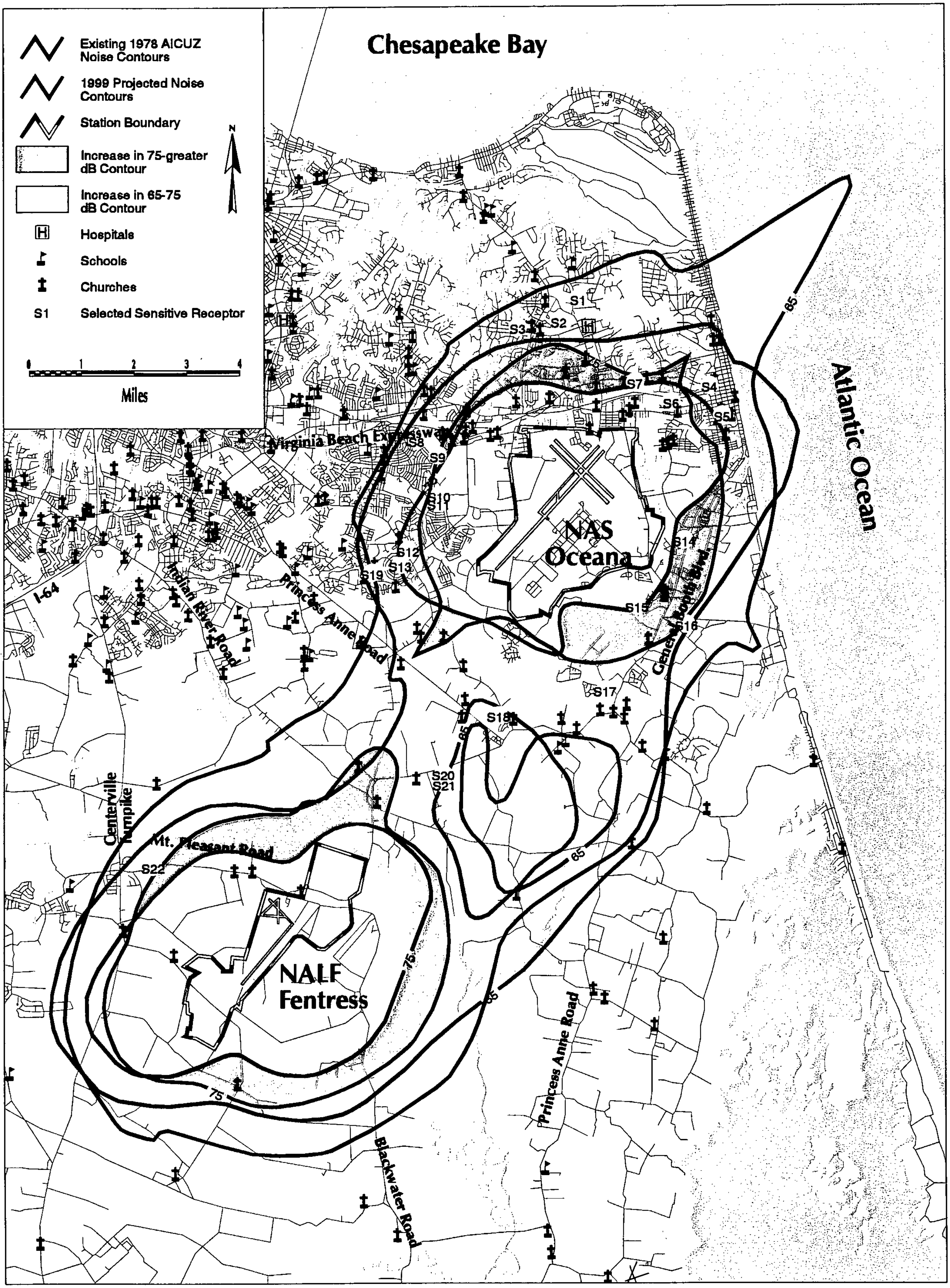
Ldn = Day-night average sound level.

contour would cover an area of approximately 28,191 acres (11,409 hectares) and an estimated population of 51,544 people, of which 16,108 were exposed to levels less than 75 dB in the 1978 AICUZ (Wyle Labs 1997). Analysis of the resulting noise impacts at NAS Oceana also indicates some reduction in noise levels for an estimated population of 10,345 people due to existing aircraft flight tracks and runway utilization.

Table 4.8-3 presents projected site-specific Ldn at schools located within the 65 Ldn or greater Ldn contour. The projected impacts at these locations vary, ranging from a 6 to 22 dB increase over existing conditions (Wyle Labs 1997). Schools are considered compatible with outside noise levels between 65 and 75 Ldn only if they have sufficient sound attenuation to reduce interior noise levels to approximately 45 dB. To analyze potential noise impacts to schools, the school-day (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) Leq was calculated for 1999 conditions for those schools expected to be within the 65 dB or greater Ldn (see Table 4.8-3). Use of central air conditioning systems in association with closed windows normally reduces noise levels by approximately 25 dB. Therefore, school sites with a 1999 exterior Leq of 70 dB or less would likely experience minimal interference. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at those schools of particular concern.

Environmental noise may interfere with a broad range of human activities including speech, communication, listening to radio, television or recorded music, studying, relaxation, and sleep. This activity interference is most often described in terms of annoyance. Various factors such as attitude towards the noise source and local conditions may influence an individual's reaction to activity interferences (FICON 1992). Additionally, noise-generated annoyance would be greater for persons outdoors, given that a house provides 15 dB (open windows) to 25 dB (closed windows) of attenuation. The varying noise levels that would be experienced by the local communities are reflected by the projected noise contours. It would be reasonable to expect that a significant increase in annoyance levels would occur with these increases in noise exposures. Disruption of speech communication and sleep disturbance would also likely occur in some areas.

As discussed in Section 3.1.8 and Appendix H, reaction to noise is highly variable among individuals. However, trends in the reaction to noise emerge when a community of



Source: U.S. Navy 1978, Wyle Labs 1997

Figure 4.8-1
ARS 1 - Comparison of 1978 and Projected 1999 Average Annual Day Noise Contours NAS Oceana

Table 4.8-3

SCHOOLS LOCATED WITHIN THE
1999 PROJECTED CONTOURS GREATER THAN 65 Ldn
NAS OCEANA/NALF FENTRESS - ARS 1

Identification Number[a]/Name	1997 Ldn (dB)	1999 Ldn (dB)	1999 Leq (dB)
S1 First Colonial High	59	69	67
S2 Lynnhaven Middle	61	72	70
S3 Trantwood Elementary	56	69	67
S4 Virginia Beach Middle	57	71	69
S5 Cooke Elementary	57	71	67
S6 Seatack Elementary[b]	63	77	75
S7 Linkhorn Elementary[b]	62	76	74
S8 Lynnhaven Elementary	55	69	66
S9 Plaza Middle	60	75	71
S10 Brookwood Elementary	66	78	75
S11 Plaza Elementary	67	79	76
S12 Holland Elementary	66	72	70
S13 Green Run Elementary	62	69	67
S14 Birdneck Elementary	67	84	76
S15 Corporate Landing Elementary & Middle	63	79	72
S16 Ocean Lake Elementary	57	74	67
S17 Strawbridge Elementary	58	70	67
S18 Kellam High	56	67	63
S19 Rosemont Elementary	59	65	63
S20 Princess Anne Elementary	52	67	63
S21 Princess Anne Middle	52	67	63
S22 Butts Road Intermediate	52	74	65

a Schools are shown on Figure 4.8-1.
b Seatack and Linkhorn elementary schools are being relocated.

Key:

dB = Decibel.
Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

Table 4.8-4

EFFECTS OF NOISE ON PEOPLE
(Residential Land Uses Only)

Effects[a]	Hearing Loss	Annoyance[b]		
Day-Night Average Sound Level in Decibels	Qualitative Description	% of Population Highly Annoyed[c]	Average Community Reaction[d]	General Community Attitude Toward Area
75 and above	May begin to occur	37	Very severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will not likely occur	22	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will not occur	12	Significant	Noise is one of the most important adverse aspects of the community environment.
60	Will not occur	7	Moderate to slight	Noise may be considered an adverse aspect of the community environment.
55 and below	Will not occur	3	Moderate to slight	Noise considered no more important than various other environmental factors.

a All data are drawn from National Academy of Science 1977 report *Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise*.

b A summary measure of the general adverse reaction of people to living in noisy environments that cause speech interference; sleep disturbance; desire for tranquil environment; and the inability to use the telephone, radio, or television satisfactorily.

c The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time. USAF Update with 400 points (Finegold et al. 1992).

d Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

Note: Research implicates noise as a factor producing stress-related health effects such as heart disease, high-blood pressure and stroke, ulcers, and other digestive disorders. The relationships between noise and these effects, however, have not as yet been conclusively demonstrated. (Thompson 1981; Thompson et al. 1989; NRC 1981; NRC 1982; Hattis et al. 1980; and EPA 1981).

individuals is considered. Community response is the term used to describe the annoyance of a group of people exposed to environmental noise sources in residential settings. Many case histories and social surveys indicate that communities are sensitive to aircraft noise intensity and the frequency of noise events (FICON 1992).

The Schultz curve (see Section 3.1.8) was used to estimate noise annoyance levels in the communities surrounding NAS Oceana and NALF Fentress. Approximately 37% to 70% of the community located in the 75 dB or greater (up to 85 dB) contour, dependent upon their exact exposure level, would be expected to be highly annoyed by the aircraft operations. Approximately 12 to 37% of the community residing in the 65 to 75 dB contour would be expected to be highly annoyed by the noise. As stated in Table 4.8-4, the community response to an Ldn of 75 or above is expected to be very severe, while the response to 65 to 75 Ldn ranges from significant to severe. Although the potential for permanent hearing loss is unlikely, temporary threshold shifts (TTS) may occur depending on an individual's outdoor exposure to various aircraft events.

Individuals spending much of their time indoors are exposed to much less noise than if they remained outdoors. As previously stated, a structure provides 15 to 25 dB of sound attenuation, depending on whether the windows are open or closed, respectively. A person located on the 75 dB contour line spending all of his or her time indoors would experience an Ldn of 50 to 60 dB. There is very little possibility of hearing loss below an Ldn of 75 dB (Wyle Labs 1997). Table 4.8-4 indicates that hearing loss (most often experienced as temporary hearing threshold shifts) may begin to occur above 75 dB.

Studies of nonauditory health consequences of aircraft noise exposure have shown a very weak association between noise exposure and nonauditory health effects (FICON 1992).

No significant vibration effects would occur as a result of these increased noise levels, because levels of 130 dB are typically required before physical effects are experienced (Wyle Labs 1997).

The maximum sound levels of typical F/A-18 events similar to those conducted at NAS Oceana and NALF Fentress are shown in Table 4.8-5. Levels for F-14s are also presented for comparative purposes. The anticipated number of daily operations by event is shown in Table 4.8-6. It should be noted that because there are several flight patterns associated with these events, no area would be subject to the total operations.

The noise contours presented in Figure 4.8-1 represent the projected flight operation plan given operational F/A-18 and F-14 requirements and flight limitations. In the last few years, NAS Oceana has evaluated numerous options to mitigate noise impacts on the local community. These include a complete review of the following:

- Arrival and departure procedures;
- Airfield hours of operation;
- Pattern altitudes;
- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

Table 4.8-5

MAXIMUM SOUND LEVELS AT RECEPTOR WITH AIRCRAFT AT 1,000 FEET AGL (decibels)

	F/A-18	F-14A	F14B/D
Departures	108	97	96
Arrivals	104	83	88
Touch-and-go	97	87	91
FCLP			
NAS Oceana	97	87	91
NALF Fentress[a]	98	90	93

[a] 800 feet AGL.

Table 4.8-6

PROJECTED AVERAGE DAY OPERATIONS FOR SELECTED F/A-18 SORTIES

	NAS Oceana	NALF Fentress
Departures	66	10
Arrivals	66	10
Touch-and-go[a]	95	0
FCLP[a]	3	64

[a] Touch-and-go and FCLP sorties equal two operations each.

Since 1995, NAS Oceana has adopted mitigation procedures to help reduce noise impacts. They include:

- Ensuring aircraft discontinue afterburner use prior to leaving field boundary;
- Eliminating most engine maintenance run-ups after 11:00 p.m.;
- Ensuring aircraft conduct straight-in arrivals after 11:00 p.m. (single approach);
- Hiring a civilian Community Planning Liaison Officer (CPLO) in the AICUZ office to provide long-term continuity on issues of noise, land use, intergovernmental coordination, as well as to provide training for squadrons on abatement procedures and individuals handling noise complaints;
- Investigation by Flight Operations and the CPLO of all noise complaints received on NAS Oceana's dedicated noise hotline and conduct of any appropriate follow-ups;
- Having all noise complaints reviewed by the NAS Oceana Commanding Officer;
- Publishing early announcements of any unusual circumstances that would require flight operations outside of normal operating hours;
- Changing takeoff procedures to allow immediate climb-out eliminating hold-down departures; and
- Establishing a TACAN navigation aid to assist pilots flying FCLPs to stay within established flight tracks.

NAS Oceana will continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options will be evaluated if ARS 1 is selected for implementation. These options include:

- Utilizing aircraft with Global Positioning System (GPS) equipment to fly all published flight patterns at NALF Fentress;
- Avoiding noise-sensitive areas to the extent operationally permitted;
- Conducting engineering evaluations of existing and proposed schools with 70 Leq or greater noise levels to determine if sound attenuation is required. The desired goal for indoor classrooms is 45 dB, assuming that closed windows and air conditioning units provide 25 dB attenuation; and

- Continuing to emphasize the issue of maintaining established flight routes and noise abatement procedures as a command priority.

To better address noise concerns from residents and to provide better coordination with local government, NAS Oceana would strengthen its noise-complaint response techniques and community outreach programs as follows:

- On-going analysis of noise-complaint trends by the CPLO to ascertain any potential operational changes which, if deemed advisable from a noise-reduction perspective, should be further examined for operational feasibility; and

- Coordinate periodic public forums on aircraft noise exposure at the station to provide an on-going dialogue with surrounding residents.

4.9 Air Quality

4.9.1 Air Quality Regulations

Air quality is governed by the Clean Air Act and its implementing regulations. The primary regulations in the Act affecting ARS 1 are the NAAQS, the General Conformity Rule, and stationary source permitting requirements. As discussed in Section 3.1.9.1, SIP provisions are designed to allow each state or commonwealth to design a plan to maintain or bring specific geographic areas into compliance with the NAAQS.

In the Hampton Roads marginal ozone nonattainment area, VOCs and NO_x are regulated to control ambient ozone concentrations. A marginal ozone nonattainment designation is the least severe nonattainment designation. Emission quantity applicability thresholds of 100 tons per year each for VOCs and NO_x apply in Hampton Roads.

4.9.2 General Conformity Rule

Federal actions below threshold levels are exempt from conformity because it is assumed the impact would be minimal on ozone levels. Emission quantities above one or both ozone precursor thresholds require a full emission analysis and conformity determination.

The General Conformity Rule's purpose is to assure that nonexempt federal actions occurring in nonattainment or maintenance areas are in compliance with the SIP applicable to the project area. When in compliance with the General Conformity Rule, a federal project will be deemed to not cause or contribute to violations of the NAAQS.

Emission quantities for this proposed action are above the applicability thresholds and no formal exemptions for the action are applicable; therefore, a full conformity determination was conducted for ARS 1 and is appended to this document (see Appendix E). For this action, a specific quantity of additional VOC and NO_x emission growth is accounted for in the maintenance plan that Virginia submitted to EPA. Virginia has petitioned for the Hampton Roads region to be redesignated as an ozone maintenance area. EPA has approved the Hampton Roads redesignation request (FR, Volume 62, Number 82, March 12, 1997). The EPA's approval was effective July 28, 1997. The Navy intends to demonstrate that the projected net emissions increase for ARS 1 conforms to the allowable emissions in Virginia's SIP.

Emissions of other criteria pollutants for which Hampton Roads is in attainment are not subject to a conformity analysis. Projected emissions for these pollutants are also presented in this section to document the emission levels.

4.9.3 Projected Emissions at NAS Oceana

Aircraft

The aircraft population stationed at NAS Oceana in 1999 (predominantly F-14 and F/A-18 aircraft) would vary from those present in 1993 (predominantly A-6 and F-14 aircraft). Air pollutant emissions would vary from 1993 to 1999 as a result of increases in the number of aircraft operations and training requirements. Also contributing to the change in emissions are different emission characteristics of the aircraft mix in 1999 compared to 1993. The aircraft emission summary for the base year (1993) and the years affected by the proposed action (1996 through 1999) are presented in Table 4.9-1.

Aircraft engine emissions are the dominant source of NAS Oceana's total ozone precursor emissions. The emission estimates for each year shown in Table 4.9-1 were derived using aircraft operation projections by aircraft type and specific emission factors for each aircraft/engine combination. The estimated nonattainment precursor emissions in 1999 for aircraft operations at NAS Oceana are 377 tons per year of VOC and 503 tons per year of NO_x. Attainment pollutant emissions are 1,010 tons per year of CO, 22 tons per year of SO_2, and 271 tons per year of PM_{10}.

Other Mobile Sources

Sources in this category include operation of ground support equipment such as tugs and jet engine starting units, engine maintenance run-ups (in-frame engine testing), and mobile electrical generators. As shown in Table 4.9-1, the total nonattainment precursor emissions for this source category in 1999 are 66 tons per year VOC and 280 tons per year NO_x. Attainment pollutant emissions are 179 tons per year of CO, 9 tons per year of SO_2, and 92 tons per year of PM_{10}.

Stationary Sources

Projected emissions from stationary sources are based on anticipated changes in the level of use of these sources and any new sources. Anticipated changes include normal growth in emissions due to changes in mission requirements. New sources in ARS 1 consist only of a AIMD Aircraft Maintenance Facility. This facility consolidates a composite materials shop, paint shop, bead blasting enclosure, and other maintenance operations currently performed on the base into a central location. The facility would be regulated under the VDEQ's stationary source permit program. Prior to construction, the Navy would apply

Table 4.9-1
EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 1
FOR 1993 AND 1996-1999
(tons per year)

	1993					1996					1997				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:															
Mobile Sources:															
Aircraft Operations	272.13	328.88	609.85	18.59	152.58	122.15	223.66	291.74	10.75	121.03	149.42	288.32	357.41	13.81	155.96
Total Aircraft	**272.13**	**328.88**	**609.85**	**18.59**	**152.58**	**122.15**	**223.66**	**291.74**	**10.75**	**121.03**	**149.42**	**288.32**	**357.41**	**13.81**	**155.96**
Other Mobile Sources:															
GSE	5.13	26.43	72.65	1.71	2.00	3.09	27.35	17.03	1.84	2.24	4.57	34.01	18.73	2.20	2.66
Maintenance Run-ups	70.29	177.95	130.69	5.82	47.42	29.40	136.41	61.78	3.90	47.42	38.29	198.30	97.19	5.86	72.28
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	**75.97**	**211.27**	**204.82**	**7.98**	**49.90**	**33.05**	**170.65**	**80.29**	**6.18**	**50.14**	**43.42**	**239.20**	**117.40**	**8.51**	**75.42**
Stationary Sources:															
Boilers:	1.13	32.32	8.31	22.09	3.84	0.78	29.13	7.52	23.76	3.63	0.78	29.13	7.52	23.76	3.63
Generators	0.71	8.67	1.87	0.57	0.61	0.71	8.67	1.87	0.57	0.61	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	6.24	37.65	49.39	1.80	4.32	3.95	28.48	39.09	1.31	3.96	5.05	37.03	50.86	1.71	4.62
JP-5 Fuel Handling	0.66	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
Service Station	19.35	0.00	0.00	0.00	0.00	4.46	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00
Painting	19.30	0.00	0.00	0.00	0.00	13.29	0.00	0.00	0.00	0.00	24.05	0.00	0.00	0.00	0.00
Construction:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary	**47.39**	**78.64**	**59.57**	**24.46**	**8.77**	**23.65**	**66.28**	**48.48**	**25.64**	**8.20**	**37.20**	**94.03**	**65.65**	**29.24**	**10.46**
Total NASO	**395.49**	**618.78**	**874.24**	**51.04**	**211.24**	**178.84**	**460.58**	**420.50**	**42.58**	**179.37**	**230.04**	**621.55**	**540.46**	**51.56**	**241.85**
NALF Fentress:															
Aircraft	13.48	146.63	37.00	6.81	30.87	11.78	155.58	25.11	6.42	42.23	13.66	189.24	29.30	7.57	55.28
Total Annual:	**408.97**	**765.41**	**911.24**	**57.85**	**242.11**	**190.62**	**616.16**	**445.61**	**49.00**	**221.60**	**243.70**	**810.79**	**569.75**	**59.13**	**297.12**

Table 4.9-1
EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 1
FOR 1993 AND 1996-1999
(tons per year)

	1998					1999				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:										
Mobile Sources:										
Aircraft Operations	299.16	429.89	788.81	19.33	231.61	376.57	503.08	1,010.07	22.26	271.03
Total Aircraft	**299.16**	**429.89**	**788.81**	**19.33**	**231.61**	**376.57**	**503.08**	**1,010.07**	**22.26**	**271.03**
Other Mobile Sources:										
GSE	3.67	34.57	17.17	2.32	2.79	3.69	34.66	17.22	1.73	1.92
Maintenance Run-ups	53.75	224.58	139.20	3.44	83.57	61.59	238.38	160.01	7.02	89.74
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	**57.99**	**266.04**	**157.85**	**6.21**	**86.84**	**65.83**	**279.93**	**178.71**	**9.20**	**92.13**
Stationary Sources:										
Boilers:	0.62	27.13	6.68	22.82	3.38	0.62	27.13	6.68	22.82	3.38
Generators	2.11	27.87	7.27	3.77	2.21	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	9.20	48.99	64.32	2.00	9.31	11.31	55.20	71.48	2.16	11.48
JP-5 Fuel Handling	0.81	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
Service Station	6.40	0.00	0.00	0.00	0.00	6.72	0.00	0.00	0.00	0.00
Painting	34.12	0.00	0.00	0.00	0.00	34.16	0.00	0.00	0.00	0.00
Construction:	2.55	26.13	8.18	2.41	4.08	0.00	0.00	0.00	0.00	0.00
Total Stationary	**55.81**	**130.12**	**86.45**	**30.99**	**18.97**	**55.82**	**110.20**	**85.43**	**28.75**	**17.07**
Total NASO	**412.95**	**826.05**	**1,033.11**	**56.54**	**337.42**	**498.23**	**893.21**	**1,274.21**	**60.21**	**380.23**
NALF Fentress:										
Aircraft	15.23	242.43	35.97	9.28	78.05	16.08	267.84	39.30	10.10	89.09
Total Annual:	**428.19**	**1,068.48**	**1,069.08**	**65.81**	**415.47**	**514.31**	**1,161.04**	**1,313.51**	**70.31**	**469.32**

Note: Shaded areas indicate nonattainment pollutants of concern.
1993 data and future year estimates based on data current as of June 4 1996.

Key: VOC = volatile organic compounds. SO2 = sulfur dioxide.
NOx = oxides of nitrogen. PM10 = particulate matter. JP-5 = jet fuel.
CO = carbon monoxide. GSE = Ground Support Equipment

for a permit to construct an air emission source. In this application, the Navy would demonstrate compliance with all applicable emission standards such as NSPS or NESHAPs, and ambient air quality review programs such as PSD or non-attainment area permitting. The VDEQ would then issue a permit to construct to the Navy only upon successful demonstration of compliance with all applicable air quality regulations. Emissions from this facility would be controlled through compliance with the permit conditions.

Emissions are presented in Table 4.9-1 for boilers, generators, engine test cells (out of frame engine testing), fuel handling, base service stations, and painting (including corrosion control). Although VDEQ does not require engine testing locations to obtain a permit, these source types are included as stationary sources for consistency with emissions analyses for MCAS Beaufort and Cherry Point. The states in which these bases are located require engine testing facilities to obtain a stationary source emission permit. Emissions of nonattainment precursor compounds (VOCs and NO_x) in 1999 are projected to be 56 and 110 tons per year, respectively. Attainment pollutant emissions are 85 tons per year of CO, 29 tons per year of SO_2, and 17 tons per year of PM_{10}.

4.9.4 Projected Emissions - NALF Fentress

NALF Fentress, also located in the Hampton Roads air basin, is used in aircraft flight training operations. Aircraft emissions at this facility are included in the emissions projection. Aircraft operations such as touch-and-go, carrier landing practice and other similar fleet and FRS aircraft procedures are conducted at NALF Fentress. These emissions are summarized by year in Table 4.9-1. In 1999, nonattainment precursor emissions (VOC and NO_x) from these operations are projected to be 16 and 268 tons per year, respectively. Attainment pollutant emissions total 39 tons per year of CO, 10 tons per year of SO_2, and 89 tons per year of PM_{10}.

4.9.5 Total Net Projected Emissions

An analysis of the projected net change in emissions was used to evaluate the air quality impacts and to determine if emissions are in conformance with the maintenance plan and VDEQ SIP. Existing emissions in 1993 from NAS Oceana were included in the Commonwealth of Virginia's baseline maintenance plan emission inventory. From this baseline, a future-year maintenance plan emission budget was prepared by Virginia that projects compliance with and demonstrates maintenance of the NAAQS for ozone. NAS Oceana is allowed specific levels of growth in ozone precursor emissions in the future-year budget. Thus, a net change in emissions is permissible for the base. Upon approval of the

maintenance plan by USEPA, the plan becomes part of the SIP. Compliance with the allowable net emissions change in the maintenance plan would demonstrate conformity with the SIP. The following discussion focuses on the projected net emissions change.

Table 4.9-2 presents the summary of net projected emissions from NAS Oceana and NALF Fentress for 1993 and 1996 through 1999 for ARS 1. The emissions increase is primarily due to increased aircraft operations and increased maintenance run-ups and test cell operation at NAS Oceana and an increase in operations at NALF Fentress. Net changes in VOC and NO_x are 105 and 396 tons per year, respectively.

These projected net changes in emissions of ozone nonattainment precursors (VOC and NO_X) are included in the future-year Commonwealth of Virginia maintenance plan emission inventory. Therefore, these emission increases would be in compliance with the SIP.

Net changes in attainment pollutant emissions are also shown in Table 4.9-2. Increases of 402 tons per year of CO, 12 tons per year of SO_2, and 227 tons per year of PM_{10} are projected.

Table 4.9-2
NET EMISSIONS CHANGE - NAS OCEANA AND NALF FENTRESS - ARS 1
(tons per year)

Year	VOCs	NOx	CO	SO2	PM10
NAS Oceana:					
1993	395.49	618.78	874.24	51.04	211.24
1996	178.84	460.58	420.50	42.58	179.37
1997	230.04	621.55	540.46	51.56	241.85
1998	412.95	826.05	1033.11	56.54	337.42
1999	498.23	893.21	1274.21	60.21	380.23
Net Change:					
1993 to 1999	**102.74**	**274.43**	**399.97**	**9.17**	**168.99**
NALF Fentress:					
1993	13.48	146.63	37.00	6.81	30.87
1996	11.78	155.58	25.11	6.42	42.23
1997	13.66	189.24	29.30	7.57	55.28
1998	15.23	242.43	35.97	9.28	78.05
1999	16.08	267.84	39.30	10.10	89.09
Net Change:					
1993 to 1999	**2.60**	**121.20**	**2.30**	**3.30**	**58.22**
Net Change NAS Oceana and NALF Fentress:					
1993 to 1999	**105.33**	**395.63**	**402.28**	**12.47**	**227.21**

Note: Shaded areas indicate nonattainment pollutants of concern. Emission estimates based on data current as of 4 June 1996.

Key:

VOC = volatile organic compounds
NOx = oxides of nitrogen
CO = carbon monoxide
SO2 = sulfur dioxide
PM10 = particulate matter

4.10 Topography, Geology and Soils

The overall effect on topography, geology, and soils at the proposed project sites under ARS 1 would be minor and due primarily to short-term construction activities. The primary effects of construction would include disturbances in and around proposed construction sites. Implementation of the proposed action would have no direct effect on geological formations underlying NAS Oceana.

Minor impacts to the surrounding soils would occur during the construction of new buildings and associated structures. Temporary impacts on soils would include compaction and rutting by vehicular traffic and potential erosion of soils. These impacts will be avoided by employing standard soil erosion and sedimentation control techniques at applicable construction sites.

4.11 Water Resources

4.11.1 Surface Water

Sedimentation from on-site construction activities is a potential, short-term impact to nearby waterbodies resulting from construction associated with ARS 1. The open drainages located close to proposed project sites are especially susceptible to sedimentation effects. Because the proposed action would disturb over 5.0 or more acres (2.0 hectares) of land in total, an amendment to the station's VPDES permit will be required for the construction phase of the project.

Long-term minor impacts to water quality could result from the increased volume of stormwater runoff resulting from the construction of new impermeable areas. In addition, increased water flow intensity and sediment loads could result from increased runoff velocity over impervious and newly cleared areas. These impacts will be offset through the incorporation of appropriate stormwater collection systems into the design of new facilities. No significant impacts to floodplains on NAS Oceana would result from projects under ARS 1; all project areas are outside 100-year floodplains at the station.

4.11.2 Groundwater

The proposed construction projects under ARS 1 would not impact the availability or quality of groundwater in the area. The proposed projects would not require further withdrawals from aquifers underlying the station.

4.11.3 Wetlands

Proposed construction under ARS 1 would result in little or no impact on existing wetlands as NAS Oceana. Only the proposed parking apron expansion area potentially could impact wetlands. All other proposed construction activities would occur in existing buildings, paved areas, or areas which are designated a uplands on the Navy' wetland inventory of the station (LANTDIV 1993).

One small wetland, approximately 0.3 acre (0.12 hectare) in size is located directly adjacent to the proposed apron expansion area. As currently proposed, the wetland would not be directly impacted by the proposed action. Sedimentation from adjacent construction activities would be the only potential short-term impact. Because adjacent areas currently drain to this wetland, some level of sedimentation is currently occurring. These impacts will be minimized through the use of appropriate erosion and sedimentation control devices (e.g., silt fences or staked hay bales) at the construction site.

4.12 Terrestrial Environment

4.12.1 Vegetation

Impacts to vegetation resulting from construction and operation of the proposed projects under ARS 1 would be considered minor. Based on preliminary construction designs/drawings, a total of approximately 4.2 acres (1.7 hectares) of maintained lawn areas that consist of planted grasses and trees would be permanently converted to an impervious surface (i.e., parking lot and/or building) and broken down for the proposed project as follows: 0.3 acre (0.12 hectare) for the training facility addition to Building 240; 0.4 acre (0.16 hectare) for the simulator addition to Building 140; 0.8 acre (0.32 hectare) for the school addition to Building 137; 1.7 acres (0.69 hectare) for the aviation maintenance additions to Buildings 401 and 513; 0.4 acre (0.16 hectare) for the aviation medical additions to Building 285; 0.3 acre (0.12 hectare) for the new corrosion control hangar; 0.3 acre (0.12 hectare) for the aircraft acoustical enclosure. Because of its previously disturbed character, the effects of the permanent removal of planted lawn and shrub areas are considered negligible. Similarly, the temporary disturbance of planted/maintained lawn areas is also considered a negligible impact.

In addition, approximately 3.1 total acres (1.25 hectares) of forested land would be removed: 0.9 acre (0.36 hectare) and 0.5 acre (0.20 hectare) for a parking lot and armament storage building associated with the proposed aviation maintenance additions; 0.2 acre (0.08 hectare) for the aircraft acoustical enclosure; and 1.5 acres (0.61 hectare) for the new BEQ. In addition approximately 20 acres (8.09 hectares) of forested, shrub, and maintained lawn would be removed for the proposed hangar and parking apron. Because the NAS Oceana property includes numerous other areas of similar vegetation, the overall impact of this action is considered minor.

4.12.2 Wildlife

Minor impacts to wildlife are anticipated from the construction and operation of the proposed project components under ARS 1. Most of the areas proposed for development currently provide very little habitat for any wildlife beyond those species adapted to disturbed, developed human environments. Such species would continue to use these areas following construction. Development around existing maintained lawns and pavement areas would result in negligible impacts to wildlife because these areas currently support few wildlife species.

Specifically, while construction and operation of the proposed F/A-18 aviation maintenance additions would be minor, the removal of forested areas associated with construction of one of the proposed parking areas and the armament storage building, as well as construction of a new BEQ and aircraft acoustical enclosure, would result in potential mortality of less-mobile forms of wildlife such as amphibians, reptiles, and small mammals that are unable to escape the construction area. However, the few individual wildlife species that inhabit this area would disperse into the similar woodland habitat surrounding the site. Impacts would be minimized by clearly defining limits of clearing at various construction sites and scheduling clearing activities outside of the nesting season.

4.12.3 Threatened and Endangered Species

The proposed projects under ARS 1 would have no effect on any protected species or special interest areas (LANTDIV 1988a). No other federal or state agency indicated the presence of threatened or endangered species at the station; therefore, no impacts would occur.

4.13 Cultural Resources

4.13.1 Archaeological Resources

To determine whether the proposed projects under ARS 1 will have any effect on archaeological resources potentially eligible for nomination to the National Register of Historic Places (NRHP), a Phase I archaeological identification survey was conducted at all but one of the affected locations in March 1996. The goal of this survey was to facilitate the Navy's compliance with Sections 106 and 110 of the 1966 National Historic Preservation Act (NHPA), as amended. The survey conclusions are documented in a report entitled *Phase I Archaeological Identification Survey in Support of 1995 Base Realignment and Closure, Naval Air Station Oceana, Virginia Beach, Virginia*. The report concludes that no impact to NHRP-eligible cultural resources would result from the proposed action and recommends no further archaeological work (E & E 1996). The findings of this report were accepted by the Virginia Department of Historic Resources (the SHPO in the Commonwealth of Virginia) in October 1996. In April 1997 a subsequent study was conducted for the parking apron expansion and hangar project areas. SHPO consultation on the project is on-going.

All proposed construction projects that would occur within previously disturbed soil units have been identified as Urban land, an Udorthents-urban land complex, and Acredale-urban land complex. Different locations display varying degrees of surface visibility which affects the suitability of various archaeological data collection techniques, such as surface collection and subsurface testing.

Numerous locations of the proposed construction projects are either covered by asphalt or correspond to the existing concrete-covered flight line. These locations were photographed whenever security considerations permitted. No removal of asphalt or concrete was carried out, and no subsurface testing was undertaken at these locations.

Several areas selected for the proposed projects displayed evidence of extensive surface modifications. These included grading, installation of concrete curbs, the presence of ditches, spoil heaps, subsurface utility lines, etc. Whenever such areas also manifested the presence of exposed surfaces (i.e., tree throw pits, erosional channels, blowouts, etc.), they were subjected to surface collection at 5- to 10-meter intervals.

Other project locations occasionally manifested localized areas of disturbance, but the integrity of the surficial deposits within the specific project location as a whole was questionable. Such locations were subjected to a subsurface investigation. The subsurface testing was conducted along parallel transects, with shovel tests established at 20-meter intervals. All shovel tests (approximately 35 to 40 cm in diameter) were excavated to sterile soils, not less

than 10 cm below the last artifact-bearing layer. Excavation proceeded by natural stratigraphy. Stratigraphic profiles were recorded as to sediment texture and color as expressed in standard Munsell notations for each shovel test. All excavated sediments were passed through 0.25-inch (0.64-centimeter), wire-mesh cloth to ensure the retrieval of small artifacts. Artifacts were recorded according to their respective stratigraphic provenance.

All shovel tests were mapped as to their respective position within the locations of the proposed projects. Cultural deposits were assessed as to their vertical and horizontal extent, integrity, and depositional character (i.e., primary deposition vs. secondary or tertiary deposition), and evaluated as to their eligibility for listing on the NRHP. The following sections summarize results and conclusions for various project sites under ARS 1.

F/A-18 Parking Apron Alterations; F/A-18 Aviation Maintenance Additions; Strike Fighter Weapon School Addition; Corrosion Control Hanger; Aviation Medical Addition; Jet Engine Testing Cell Replacement; Aircraft Acoustical Enclosure; Installation of Secure Vaults in Hangars; Renovations to Building 122

These proposed projects correspond to locations that sustained a severe prior surficial disturbance. This included grading, excavation of ditches, installation of asphalt and concrete surfaces, excavation of trenches for subsurface utilities, etc. These locations are not likely to contain significant intact archaeological deposits.

F/A-18 Simulator Building Addition

Most of the surface area of the proposed addition corresponds to the asphalt parking lot. A graded lawn abutting Building 140 from the west was subjected to subsurface testing. This testing identified the presence of modern artifacts in a matrix of secondary or tertiary deposits. This location does not contain significant intact archaeological resources and is not eligible for listing on the NRHP.

Renovation/Addition to NAMTRAGRUDET Training Facility

Subsurface testing of the location of the proposed project indicated an absence of archaeological deposits.

Bachelor Enlisted Quarters and Parking

Subsurface testing of the location of the proposed project indicated an absence of archaeological deposits.

Parking Apron Expansion and Aircraft Hangar

The area of these proposed projects covers an approximately 20-acre (8-hectare) parcel that abuts the existing apron from the east. This parcel incorporates wooded terrain, areas of pioneering growth in recently cleared locations and areas of maintained lawn. A network of ditches of varying depths and widths as well as graded firebreaks dissect the area of the proposed construction. Numerous spoil heaps, push piles, dredged sediment backpiles, firebreaks and dirt roads were observed during the survey. During the fieldwork, a total of 150 shovel tests were excavated along the 17 survey transects. These shovel tests were placed either at 20 meter intervals or as dictated by the localized surface conditions. A small area (approximately 1 acre [0.4 hectare]) in the extreme northeastern part of the surveyed parcel corresponded to a plowed field; this location was subjected to an intense surface collection. Sediments in ditch walls were selectively examined for manifestations of cultural features and/or artifacts.

In the course of the survey, it was determined that relatively intact natural deposits exist in the central and eastern portions of the footprint of the proposed hangar. These natural deposits yielded no evidence for cultural stratigraphy, features, or artifacts. The area of the proposed apron has sustained an extensive disturbance during the prior surface modification activities that resulted in the elimination of the upper portion of natural deposits and/or deposition of fill. Very few modern artifacts (i.e., beer glass, asphalt, concrete, 25 mm aircraft gun shell case etc.) were found during the survey.

Based on the results of this survey, the proposed project area does not contain NRHP-eligible resources, and no additional work is necessary.

4.13.2 Architectural Resources

No impacts to significant architectural resources at NAS Oceana would occur as a result of proposed projects under ARS 1. As discussed in Section 3.1.13, no buildings that would be affected are eligible for inclusion in the NRHP.

4.14 Environmental Contamination

4.14.1 Hazardous Materials and Waste Management

Realignment of 11 F/A-18 squadrons plus the FRS would increase the use of hazardous materials and generation of hazardous waste at NAS Oceana because of the maintenance and repair activities associated with the aircraft. The types of waste would not differ from existing operations currently conducted at NAS Oceana.

The amount of increased hazardous waste generated is estimated to be approximately 57,000 lbs. (25,855 kilograms), which is a 41% increase over wastes generated in 1995.

4.14.2 Installation Restoration Program

The following construction projects necessary to support the realignment of F/A-18 aircraft are located in the vicinity of SWMUs 2B and 2C:

- New Hangar and Parking Apron Expansion;
- Corrosion control hangar;
- Strike fighter weapons school addition; and
- F/A-18 aviation maintenance additions and parking lot.

RCRA CMS for these SWMUs have resulted in the recommendation of groundwater extraction and treatment. A pilot test is currently being conducted to determine the feasibility of in situ treatment. Once the treatment system has been selected, the design will be reviewed by the Navy personnel in the hazardous waste engineering group to ensure that no conflicts will occur as a result of the proposed construction projects.

Soils were tested as part of the RCRA Facility Investigation (RFI) for SWMU 2B. None of the soil samples contained chlorinated VOCs, but several of the samples contained trace amounts of BTEX compounds (CH2M Hill 1995). Soil samples were also collected for the RFI for SWMU 2C. Chlorinated VOCs contamination was confined mainly to the southeast corner of Building 301 (CH2M Hill 1995). No construction is proposed in this area. Impacts associated with construction in a SWMU, including worker health and safety and soils disposal constraints, should be minimal.

5 Environmental Consequences and Mitigation Measures: Alternative Realignment Scenario 2

ARS 2 would involve realigning two F/A-18 fleet squadrons to MCAS Beaufort, with the remaining nine F/A-18 fleet squadrons and F/A-18 FRS realigned to NAS Oceana. Therefore, this section discusses potential impacts at MCAS Beaufort and NAS Oceana. Where appropriate, mitigation measures to avoid or lessen the severity of projected impacts are discussed.

5.1 Environmental Consequences and Mitigation Measures: ARS 2 at MCAS Beaufort

5.1.1 Airfield Operations

The projected F/A-18 operations under ARS 2 would not significantly affect airfield operations at MCAS Beaufort. Projected F/A-18 operations were calculated as part of the noise impact analysis conducted at the station (Wyle Labs 1997).

Table 5.1-1 presents projected F/A-18 operations at MCAS Beaufort under ARS 2. Total operations would increase from 1997 levels, growing from approximately 38,000 to almost 53,000 total operations. This would represent a 40% increase over 1997 levels (Wyle Labs 1997).

Based upon the training requirements at MCAS Beaufort, F/A-18 aircraft that would be realigned under ARS 2 could complete their required number of operations without significantly affecting overall airfield operations at the station. Unusually long taxi times, fuel pit delays, or denials of access to certain patterns would not occur at the station as a result of ARS 2 (Wyle Labs 1997).

5.1.2 Military Training Areas

5.1.2.1 Military Training Routes

MTRs in the vicinity of MCAS Beaufort (i.e., VR-1004, VR-97, VR-1040, and IR-18) would not be significantly affected by the implementation of ARS 2. Based upon projected MTRs usage rates for ARS 1 and ARS 2, the potential MTR usage in the vicinity of MCAS Beaufort is estimated at 100 annual sorties (ATAC 1997). No individual MTR would increase significantly over existing levels, and no significant noise increases would occur under the routes.

5.1.2.2 Warning Areas

A limited number of F/A-18 aircraft would be transferred to MCAS Beaufort under ARS 2. These aircraft would train with Marine Corps aircraft at the station. Therefore, there would be a slight increase in utilization rates for warning areas in the area around MCAS Beaufort.

5.1.2.3 Military Operating Areas

As with warning areas, no significant increase in aircraft operations would occur as a result of limited amount of aircraft being transferred to MCAS Beaufort under ARS 2.

Table 5.1-1

**1997 AND PROPOSED 1999 F/A-18 OPERATIONS UNDER ARS 2
MCAS BEAUFORT**

Activity Description	Day 0700-2200		Night 2200-0700		Total Operations	
	Existing	ARS 2	Existing	ARS 2	Existing	ARS 2
Departures	10,587	13,041	93	158	10,680	13,199
Full Stop Arrivals	5,541	5,864	227	344	5,768	6,208
Overhead and Carrier Break Arrivals	4,871	6,869	41	126	4,912	6,995
Touch-and-Go Operations/Low Approaches	4,546	9,607	160	736	4,706	10,342
Field Carrier Landing Practice	9,805	12,434	2,088	3,900	11,893	16,334
GCA Box	28	100	0	6	28	106
Total	35,378	47,915	2,609	5,270	37,987	53,185

Source: Wyle Labs 1997.

5.1.3 Target Ranges

The implementation of ARS 2 would result in a slight increase in the use of the Townsend Bombing Range by Navy F/A-18 aircraft. Based upon projected usage rates for the Dare County Range, BT-9, and BT-11 in North Carolina under ARS 1 and ARS 2 (ATAC 1997), it is estimated that approximately 460 total annual sorties would be conducted at the Townsend Bombing Range by Navy F/A-18 aircraft under ARS 2. Approximately 97% of these (446 sorties) would be conducted during daytime hours, with the balance (14 sorties) conducted during nighttime hours. Atlantic Fleet F/A-18s, now at NAS Cecil Field, currently use this range for training. The additional sorties would not significantly affect the efficiency of the range's operations in the area surrounding the range. Projected usage of the Townsend Bombing Range is estimated at 4,000 annual sorties (Georgia Air National Guard 1995). The increase of approximately 460 F/A-18 sorties would not significantly affect noise levels in the vicinity of the range.

Given the limited number of projected sorties by Navy F/A-18 aircraft associated with ARS 2, no significant impacts would occur to land use, water quality, or terrestrial resources at the range. Navy F/A-18 aircraft would use existing flight tracks and range targets as its Marine Corps counterparts at MCAS Beaufort; therefore, no significant changes from current conditions would occur as a result of ARS 2.

5.1.4 MCAS Beaufort Land Use

5.1.4.1 Projected Land Use

Proposed land use changes at MCAS Beaufort resulting from ARS 2 would be relatively minor. The proposed apron alterations would involve minor land disturbance associated with the construction of the MF Pad adjacent to the flight line, which would result in the conversion of approximately 8 acres of planted pine forest to aircraft operations. Because this proposed change is consistent with surrounding on-station development, it would not be significant.

Because the scope of the projects is minor and the project locations are removed from surrounding properties, proposed projects under ARS 2 would not result in conflicts with land uses surrounding MCAS Beaufort.

5.1.4.2 Land Use Plans and Policies

Proposed projects under ARS 2 would resul‧ i‧ no land use incompatibilities with the existing or proposed land uses in the MCAS Beau‧ Master Plan. The Administration Building would be inconsistent with the Master Plan. Project description, location, and proposed land use classifications are discussed below.

- Parking apron expansion would be located adjacent to, and west of Runway 32 and would be consistent with the Master Plan designation of this area as "operations." This expansion would impact 26 acres (10.5 hectares).

- The hangar renovations/addition would be located south of the cross runway configuration and would be consistent with the Master Plan designation of this area as "operations."

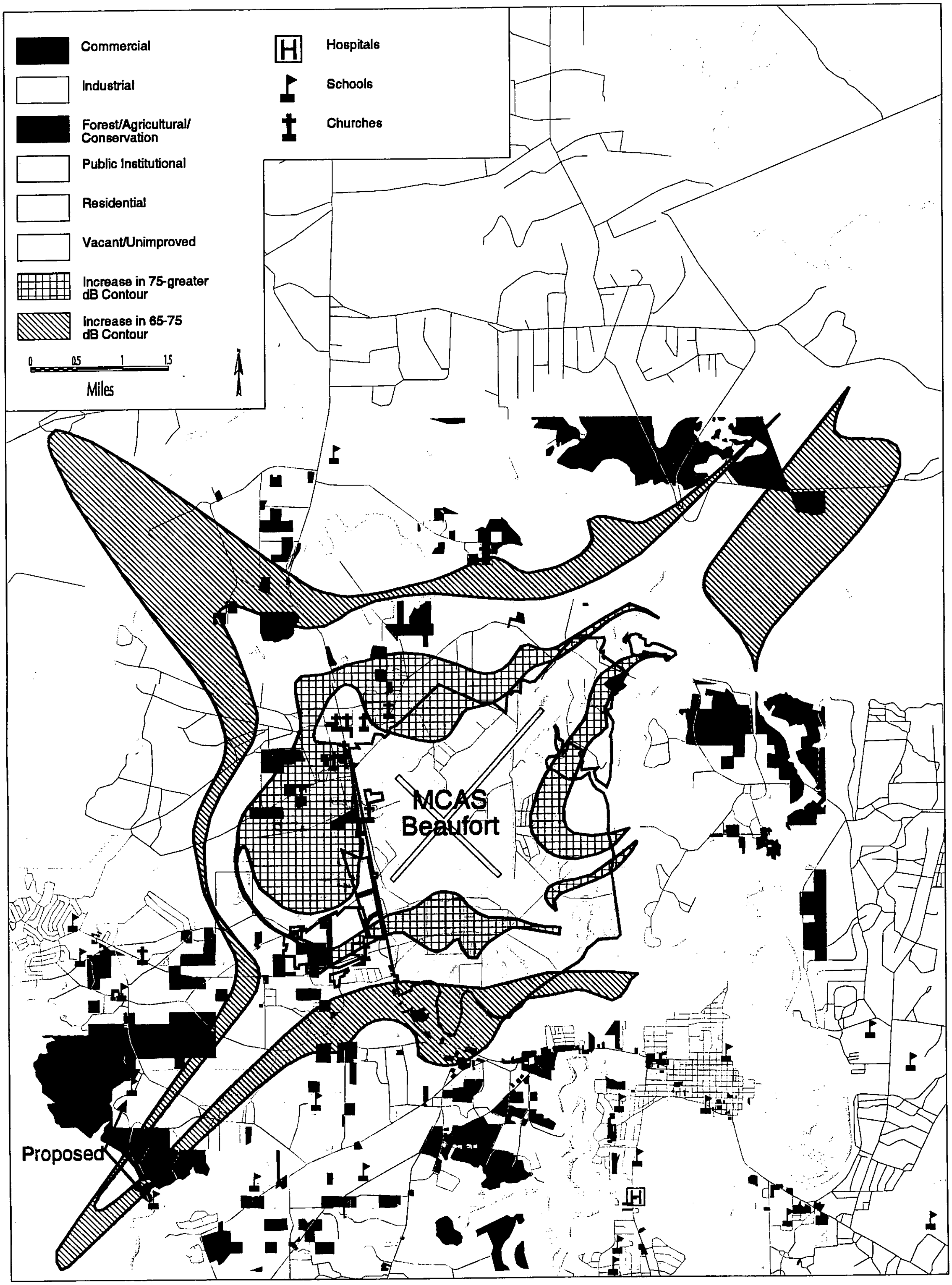
- The MF Pad would be located along Drayton Street south of the cross runway configuration, and would be consistent with the Master Plan designation of this area as "operations". The MF Pad would impact 8.9 acres (3.6 hectares).

- The administrative building would be located along Elrod Street and would be inconsistent with the Master Plan designation as "operations." However, the administrative functions would not significantly impair the intent of the plan for this area of the station. The administrative building would impact 0.4 acre (0.1 hectare).

These actions would not result in any significant long-term land use disturbances or changes at the station. Therefore, projects associated with ARS 2 would be consistent with the station's Natural Resources Management Plan.

With regard to the AICUZ program at MCAS Beaufort, noise impacts from the implementation of ARS 2 would result in the expansion of associated noise zones (see Section 5.1.8). Part of the increase is attributable to changes in runway utilization between the 1994 AICUZ and the projected contours. The 65 to 75 dB Ldn contour (i.e., Noise Zone 2) would increase by approximately 4,983 acres (2,017 hectares) from the corresponding area in the station's current AICUZ program. The 75 dB or greater Ldn contour (i.e., Noise Zone 3) would increase by approximately 2,071 acres (838 hectares) from the corresponding area in the current AICUZ program. Figure 5.1-1 presents the increase in land use coverage between the existing AICUZ and projected 1999 noise contours at MCAS Beaufort under ARS 2. As shown, larger areas would be exposed to aircraft noise.

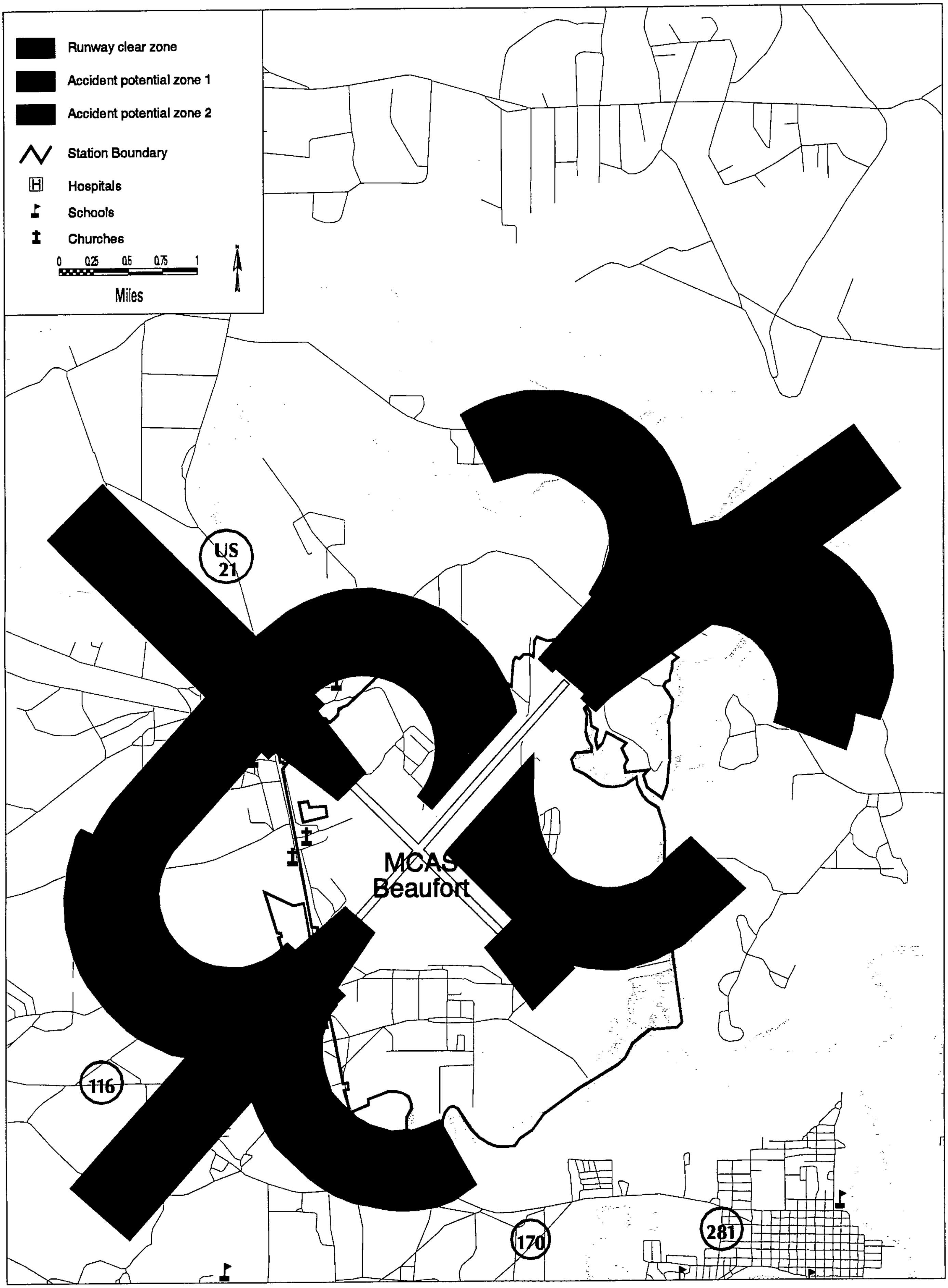
With regard to APZs under the MCAS Beaufort AICUZ Program, implementation of ARS 2 would result in an increase of 2,372 acres (939 hectares) over existing conditions (see



Source: SOUTHDIV 1994;Wyle Labs 1997

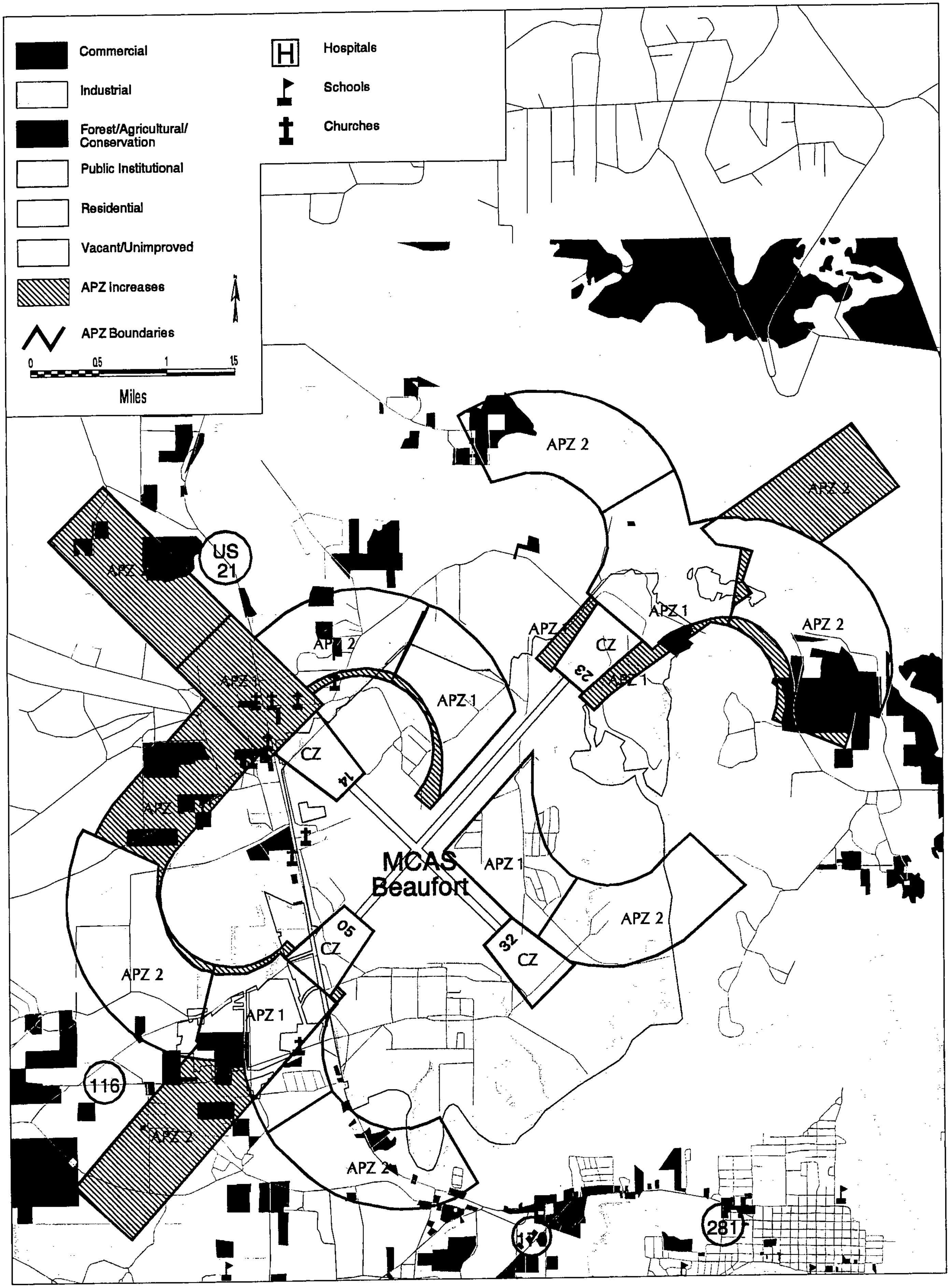
Figure 5.1-1

ARS 2 - Increase Between Existing AICUZ Noise Contours and Projected 1999 Noise Contours and Land Use MCAS Beaufort



Source: Wyle Labs 1997

Figure 5.1-2
ARS 2 - Projected 1999 APZs
MCAS Beaufort



Source: SOUTHDIV 1994;Wyle Labs 1997

Figure 5.1-3
ARS 2 - Increase Between Existing AICUZ and Projected 1999 APZs and Land Use
MCAS Beaufort

Table 5.1-2

LAND USE WITHIN EXISTING (1994) AND PROJECTED (1999) APZs
AT MCAS BEAUFORT
ARS 2

	1994 Acres	1994 Hectares	Projected Acres Impacted	Projected Hectares Impacted	Change in Acres/ Hectares
Clear Zone					
Military Installation	498	202	498	202	0/0
Unimproved/Vacant	21	8	21	8	0/0
Residential	1	<1	1	<1	0/0
Industrial	0	0	0	0	0/0
Commercial	0	0	0	0	0/0
Forested/Agriculture/Conservation	0	0	0	0	0/0
APZ 1					
Military Installation	782	316	912	369	130/53
Unimproved/Vacant	812	329	1,064	431	252/102
Residential	115	47	207	84	92/37
Industrial	8	3	11	4	3/1
Commercial	1	<1	12	5	4/5
Forested/Agriculture/Conservation	59	24	80	32	21/8
Water	155	62	140	56	-15/-6
APZ 2					
Military Installation	169	68	204	83	35/15
Unimproved/Vacant	2,049	829	3,129	1,266	1,080/437
Residential	319	129	492	199	173/70
Industrial	59	24	67	27	8/3
Commercial	25	10	79	13	54/3
Forested/Agriculture/Conservation	248	100	478	193	230/93
Water	371	150	670	271	299/121
Total	**5,693**	**2,304**	**8,065**	**3,243**	**2,372/939**

Table 5.1-2). Figure 5.1-2 presents the projected 1999 APZs, which include APZs under the existing AICUZ program as well as the APZs associated with operations of two additional F/A-18 squadrons. Figure 5.1-3 presents the increase between existing AICUZ and projected 1999 APZs and land use.

As discussed in Section 3.1.4, the APZs do not indicate the probability of an accident but rather the probable accident location should an accident occur. Appendix G provides more information on the development of APZs. The Navy's recent update of aircraft accident data for the period from 1982 to 1997 indicates that the F/A-18 experiences fewer accidents than other fighter aircraft in the inventory. In fact, during this period only three F/A-18 Class "A" accidents (i.e., aircraft suffered more than $1 million in damage or a fatality occurred) were reported within a 5-mile radius of Navy and Marine Corps airfields in the U.S. and Japan.

Implementation of ARS 2, with resulting changes in noise levels and APZs, may affect availability of federally guaranteed mortgage loans. HUD, FHA, and VA mortgage policies generally prohibit guaranteeing mortgage loans for new homes located within noise contours of 75 dB Ldn or greater or within clear zones. These same mortgage policies make availability of federally guaranteed mortgage loans discretionary for new homes located within noise contours of 65 to 75 dB Ldn.

The term "new home" includes new construction, existing homes that are less than one year old, and existing homes that have been substantially remodeled. HUD, FHA, or VA mortgage policies may also impose conditions on mortgage loan guarantees (such as written acknowledgement of noise conditions) for existing homes located in noise contours of 75 dB Ldn or greater or within clear zones.

Because construction of the MF Pad would impact the natural resources of the South Carolina coastal zone, a determination of the project's consistency with the enforceable policies and procedures of the South Carolina Coastal Management Program would be required. Implementation of the MF Pad project would require permits/reviews from South Carolina OCRM for stormwater management and water quality; however, the Navy has determined that the proposed action would be consistent to the maximum extent practicable with the South Carolina Coastal Zone Management Plan.

Because of the relatively small number of positions that would be established at MCAS Beaufort under ARS 2, it is not expected that increased personnel loading would result in any indirect impacts to local land use patterns in the county, such as expanded residential development to satisfy future housing demand. Therefore, ARS 2 would be generally consistent with Beaufort County's Comprehensive Plan and Zoning and Development

Standards Ordinance. With the projected changes in AICUZ areas from the relocation of the F/A-18 aircraft to the station, minor indirect development impacts would potentially occur in the areas around MCAS Beaufort considering the county's administration of land use in these areas. These would potentially include: an increase in the number of development restrictions implemented (e.g., required noise reduction in proposed developments under the AOD ordinance); and an increase in the number of development actions permitted with conditional restrictions.

5.1.5 Socioeconomics and Community Services

5.1.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

The relocation of two F/A-18 fleet squadrons to MCAS Beaufort under ARS 2 would have a minor impact on the station's and Beaufort County's population. The proposed realignment would result in the transfer of approximately 500 personnel, including 58 officers and 418 enlisted personnel, to MCAS Beaufort, thus increasing current personnel loading by this amount.

The demographic characteristics of Beaufort County would only be slightly impacted by these proposed personnel movements. When various demographic attributes of the relocating population are taken into account, such as marital status, average number of dependents, and typical household size, an estimated 1,110 persons including military personnel and their dependents are expected to relocate to the area surrounding the station. Assuming that the existing geographical distribution of military personnel by place of residence remains constant, it is estimated that 1,090 of the new residents would move into Beaufort County as a result of the proposed realignment with the remaining 20 additional persons residing in other counties throughout the region (see Table 5.1-3). Given the size of Beaufort County, these 1,090 new residents would have very little impact on the demographic characteristics of the county. The influx of these new residents would represent an increase of only 1.3% of the county's total population.

Economy, Employment, and Income

The proposed relocation of two F/A-18 aircraft squadrons to MCAS Beaufort under ARS 2 would have a positive, long-term impact on the economy of Beaufort County and the region as a whole. Direct military employment on-station would increase by approximately

Table 5.1-3

NET SOCIOECONOMIC IMPACTS OF THE PROPOSED REALIGNMENT AT MCAS BEAUFORT UNDER ARS 2

	Beaufort	Charleston	Colleton	Hampton	Other	Total Effects
Population Impacts						
Total Military and Civilian Personnel Relocating	490	0	0	0	10	500
Number of Military Dependents	600	0	0	0	10	610
Total Population Change	1,090	0	0	0	20	1,110
Personnel and Regional Housing Impacts						
Total Officers Relocating	70	0	0	0	0	70
Total Enlisted Personnel Relocating	420	0	0	0	10	430
Total Military Households Relocating	490	0	0	0	10	500
Fiscal Impacts						
Total Population Change	1,090	0	0	0	20	1,110
Local Per Capita Tax Contribution	$1,200	$0	$0	$0	NA	NA
Estimated Change in Local Tax Contributions	$1,308,000	$0	$0	$0	NA	$1,308,000
Education Impacts						
Total Elementary School-age Children	140	0	0	0	0	140
Total Middle School-age Children	40	0	0	0	0	40
Total High School-age Children	30	0	0	0	0	30
Total Number of School-age Children	210	0	0	0	0	210

Note: Totals may not add due to rounding.
Less than 10 additional military personnel are expected to live in Charleston, Colleton, and Hampton Counties.

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500 positions over current levels, as a result of ARS 2. This increase in direct employment would expand the stations's total military and civilian payroll by approximately $20 million a year. In addition, the proposed realignment would inject approximately $9.6 million into the regional economy through an increase in construction expenditures needed to accommodate the additional personnel and aircraft.

As additional income is injected into the regional economy through changes in payroll, procurement, and construction expenditures, employment and earnings in the regional economy will be expanded. As described for NAS Oceana under ARS 1, every new job created in MCAS Beaufort and every additional dollar spent in the local economy would stimulate the area's economy and create additional business opportunities.

As the relocating personnel move to MCAS Beaufort and begin to spend a portion of their disposable income in the regional economy, and as MCAS Beaufort spends additional money for local contractors and purchases, the profits and sales of local retailers and suppliers would increase. In turn, these local retailers and suppliers may increase employment and/or increase the purchase of raw materials from their local suppliers. Thus, the positive economic impacts of the original injection of funds would be cycled back into the economy, repeating or "multiplying" the original effect.

By using the Regional Input-Output Model (RIMS II), which was designed by the U.S. Bureau of Economic Analysis, the total (direct and indirect) impacts of the increase in construction expenditures have been quantified. As shown on Table 5.1-4 the $9.6 million construction projects would increase employee earnings in Beaufort County by $1.8 million and create 85 additional jobs. When the indirect effects associated with increase of $20 million in military payroll are considered, this positive economic impact would be greater.

Housing

While the proposed realignment would increase the demand for all types of military-controlled housing, the greatest demand will be for BEQs. As a result of an on-going construction project, all of the inadequate BEQ spaces at MCAS Beaufort will be replaced with adequate facilities. However, the total number of BEQ spaces available on-station will decline to 1,550 spaces following completion of this project. This decline in spaces, combined with the increase in the number of enlisted personnel assigned to station and the change in the U.S. Marine Corps' billeting requirements, would cause a shortfall in the number of available BEQ spaces. Assuming that 20% of the total enlisted personnel relocating would chose to live on-station in the BEQ's, approximately 90 bachelor enlisted personnel would live on-station and the remaining 340 enlisted personnel would live off-

Table 5.1-4

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF TWO F/A-18 SQUADRONS TO MCAS BEAUFORT UNDER ARS 2

Impact	
Direct Economic Impacts	
Increase in Military and Civilian Payroll	$19,910,000
Construction expenditures	$9,600,000
Total	$29,510,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$1,800,000
Employment Impacts (jobs)	85

[a] Indirect economic impacts have only been calculated for construction expenditures.

station in the local community. In order to handle this extra demand, several steps could be taken, such as not allowing geographical bachelors to reside in the BEQs, requiring senior enlisted personnel to live off-station, and/or placing more personnel per BEQ room (Snead 1996).

In contrast, the BOQs are not expected to be significantly affected by the proposed relocation. Given the existing vacancy rate, the relatively few officers relocating, and the propensity of most officers to live in the local community, little impact would occur to the BOQs at MCAS Beaufort.

Finally, the proposed relocation could also create an additional demand for military family housing. Assuming a family housing requirement factor of 60% and that 10.5% of these families would choose voluntary separation, approximately 270 military households would require family housing on-station or in the local community. Because many of these 270 military families would prefer to live in military-controlled housing, waiting lists for military-controlled family housing would become longer as a result of the relocation. However, when the proposed construction of 280 or more new family housing units at the station's Laurel Bay Family Housing Area is completed, family housing availability would be similar to current conditions. The increase in personnel would correspond closely to the total number of new housing units being built. Therefore, if this program is completed there would be very little impact on military family housing at MCAS Beaufort.

Since most military families prefer to live in military-controlled family housing, it is assumed that if the proposed construction of family housing units at the Laurel Bay Housing Area is completed, each of these units would be filled. Therefore, between 140 and 280 or more of the relocating families are projected to live at MCAS Beaufort. The remaining families would live in the local community.

The additional 500 personnel that would relocate to Beaufort County would have only a very minor impact on the county's housing market. The expected increase in the demand for housing units would be so small when compared to the overall size of the market that the proposed relocation would not have a noticeable impact on the supply or price of housing units in the county.

Taxes and Revenues

The proposed realignment of two F/A-18 aircraft squadrons to MCAS Beaufort would have a positive impact on the generation of tax revenues in Beaufort County and in the State of South Carolina as a whole. Property taxes, sales tax, and corporate income tax receipts would all be expected to increase as a result of the increased economic activity caused by the proposed realignment.

As described in previous sections, the proposed realignment would result in a increase of 1,090 residents (including dependents) in Beaufort County. Assuming that the current local per capita tax contribution of nearly $1,200 would remain constant, these 1,090 new residents would generate approximately $1,308,000 each year in additional local tax revenues.

The increase in population would increase the demand for community services and facilities, forcing the county to spend additional monies to meet this increase in demand. In particular, the increase in school-age military dependents would lead to an increase in the total school expenditures. The Beaufort County Public School System, which is the only school district that would be significantly affected by ARS 2, may receive impact aid from the U.S. Department of Education for these additional students. This would cover a portion of the average costs per student.

Since 280 or more family housing units will be constructed at MCAS Beaufort, a large number of the relocating families are expected to live on-station. In addition, since the DoD operates two elementary schools that serve all elementary school children living on federal property, only a limited number of additional students are expected to attend the Beaufort County schools. Thus, this would reduce the total fiscal impact on the school system.

Also, as the Navy spends additional funds via construction activities and procurement expenditures, the total amount of economic activity in the region would increase. As a result

additional employment, employee earnings, sales receipts, and economic output would all expand leading to an increase in tax revenues. Because of these factors, Beaufort County is not expected to experience any significant adverse impacts from the proposed realignment.

5.1.5.2 Community Services

Fire and Emergency Services

The proposed relocation of two F/A-18 aircraft squadrons to MCAS Beaufort under ARS 2 is not expected to adversely affect the provision of fire protection on-station. Current staffing and equipment levels are considered sufficient to accommodate any increase in the demand for fire protection services at MCAS Beaufort.

Likewise, the projected increase of 1,090 residents in Beaufort County is not anticipated to negatively impact the provision of fire and emergency services in the surrounding communities. At present, Beaufort County has approximately 1.8 fire fighters per 1,000 residents. Upon completion of the proposed realignment, this ratio will remain unchanged indicating no change in the level of service.

Security Services

The additional 500 military personnel that would be assigned to MCAS Beaufort may have a slight impact on the provision of security services on-station. Because these additional personnel would increase the number of passes/decals that are issued and flight line security would have to be expanded, additional security personnel may be required (Sontage 1996).

The proposed realignment would have little impact on the provision of security services in surrounding communities. Currently, Beaufort County has approximately 1.6 police officers per 1,000 residents. The level of service provided to local residents would not change as a result of the proposed realignment.

Medical Services

The Naval Hospital Beaufort, located on Port Royal Island, and MCAS Beaufort Medical/Dental Clinic provide all medical and dental support for active duty personnel and dependents assigned to MCAS Beaufort. Treatment for F/A-18 squadron personnel and their dependents can be absorbed into the current medical and dental workload of the hospital and clinic. No additional medical or dental facilities would be required (LANTDIV 1996b).

Recreational Facilities

The proposed realignment would have little impact on the provision of recreational facilities at MCAS Beaufort. Although the additional personnel would increase the demand for on-station recreational facilities and services, the existing facilities should be more than adequate to handle the increased usage (Wilson 1996).

Education

The proposed realignment is expected to have little impact on the two DoD-controlled schools currently operating at MCAS Beaufort. The total number of military-controlled housing in Beaufort County is not expected to be impacted by the proposed realignment because the total number of elementary school-age military dependents living in base housing is unlikely to change significantly as a direct result of the proposed relocation. Therefore, this project would not significantly impact the DoD-controlled schools.

However, the proposed realignment would have a more significant impact on the Beaufort County Public Schools. Using the current demographic characteristics of the relocating squadrons and their dependents, it is estimated that approximately 210 additional school-age children would attend the Beaufort County Public Schools. The majority of these students (140 pupils) will be elementary school-age, with the remaining children attending middle school (40 students) and high school (30 students) (see Table 5.1-3).

The impact of these 210 students would be somewhat tempered by the size of the school district. The increase in students would represent only a 1% increase in the total enrollment of the Beaufort County Public Schools. In addition, the school district is accustomed to handling large increases in total enrollment; gains of 400 to 500 students a year are not uncommon. Finally, completion of the major building and renovation program that was approved under the 1995 bond act should result in a significant increase in the total capacity of the district. As a result of all these factors, the Beaufort County Public Schools would have sufficient capacity to handle the additional students.

5.1.6 Infrastructure

5.1.6.1 Water Supply

The realignment of F/A-18 aircraft under ARS 2 would result in a net increase of approximately 500 military personnel at MCAS Beaufort. Given the existing shortfalls of on-station BEQs discussed in Section 5.1.5, it is assumed for purposes of infrastructure issues, that no significant net increase (i.e., less than 100 persons) in military personnel residing at

the station would occur as a result of ARS 2. However, the station would experience an increase in water use from the increase in the daytime working population.

According to personnel at MCAS Beaufort, average daily water usage is roughly 0.35 MGD at the station and approximately 4% of the average usage in Beaufort County. It is expected that during an average day, personnel working at MCAS Beaufort use 30 gallons of water per person. Therefore, the net increase in daily water consumption by additional personnel would be 0.015 MGD. Based on an excess capacity of 6 to 9 MGD in BJSWA's water system, and the improvements to be made to the station's existing water system, the station would have sufficient capacity to accommodate increases projected under ARS 2.

With dependents, the net increase in personnel at MCAS Beaufort would result in an estimated total of 1,110 persons to the region. Based on existing demographic data, it is expected that 1,090 of these persons would reside in Beaufort County. According to the BJWSA, gross water usage per capita is roughly 95 gallons per day. Therefore, the daily increase in water consumption would be approximately 0.10 MGD. The county has sufficient excess capacity to support this additional water demand.

5.1.6.2 Wastewater System

At MCAS Beaufort, the wastewater plant has a 1 MGD design flow capacity and an average flow rate of 0.30 MGD. The station's NPDES permit allows for a maximum effluent discharge of 0.75 MGD. Assuming that wastewater generated at the station equals approximately 80% of the water consumed (ICMA 1988), approximately .012 MGD of additional wastewater would be generated. Based on the available capacity at the wastewater treatment plant, the station would have sufficient capacity to support the projected additional load. While the system's current inflow/infiltration will continue to be a problem pending programmed rehabilitation work (i.e., associated with excessive flows during periods of heavy rain), the projected increase would not significantly compound this problem.

As stated in Section 3.2.6.2, wastewater treatment within Beaufort County is provided by various entities and is accomplished through a combination of public and private systems, including private septic systems, package treatment plants, and wastewater treatment plants. Given the relatively small population increases that would occur in Beaufort County under ARS 2, no individual system or method of wastewater treatment would be significantly impacted.

5.1.6.3 Stormwater

In accordance with the policies and procedures of the South Carolina Coastal Management Program, a stormwater management permit is required for land disturbing activity. The only project that would include land disturbing activity at MCAS Beaufort under ARS 2 is the proposed MF Pad. Construction of this pad would increase stormwater runoff rates in the vicinity of the flight line. Given currently planned improvements to the station's stormwater management systems, specifically the planned construction of a new stormwater retention facility in proximity to the MF Pad site, this increase would reasonably be accommodated by the station's current systems (Sinclair 1996).

There is a potential for the degradation of stormwater runoff due to additional aircraft operation and maintenance activities occurring at the station; however, with oil/water separators already installed in areas of concern, additional aircraft operations are not expected to have a significant impact. In addition, with continued efforts to better manage stormwater runoff, such as the monitoring of discharge points, no significant impact would occur.

5.1.6.4 Electrical

As stated in Section 3.2.6.4, SCE&G supplies power to MCAS Beaufort via a 115 kV electric transmission line to a substation located in the core area. From the substation, power distribution throughout the station occurs through four overhead 12.5 kV electric distribution lines. The substation, in 1996, had 1.5 megawatts of excess capacity, under peak demand conditions (Hager 1996). The station has adequate electric capacity to support the increased demand that would occur under ARS 2 (Webb 1996).

5.1.6.5 Heating

Domestic hot water, low-temperature heated water, and some steam is distributed throughout the majority of the core area from the central heating plant, Building 426. With the recent upgrades to the system, the boilers and the lines are in good condition and are adequately sized to meet existing and foreseeable demand at MCAS Beaufort under ARS 2 (Tisdale 1996).

5.1.6.6 Jet Fuel

As stated in Section 3.2.6.6, the recent upgrades to the jet fuel system increased the capacity to fuel aircraft. With only two or three pits in use under normal operating

conditions, the overall increase in aircraft operations at MCAS Beaufort proposed under ARS 2 would not significantly impact jet fueling capabilities at the station (Galloway 1996).

5.1.6.7 Solid Waste Management

According to personnel at Beaufort County's Public Works Department, the average per capita solid waste generation rate is 1.2 tons (1.1 metric tons) per year. Therefore, under ARS 2, municipal solid waste in the county would increase by roughly 1,300 tons (1,170 metric tons) per year. An increase in 1,000 tons of solid waste is less than 1% of the total tonnage received at the Hickory Hill landfill facility every year. According to personnel at the landfill, there is currently available capacity for 12.5 years. This is expected to increase to 32 years with a proposed vertical expansion project. Therefore, the Hickory Hill landfill has adequate capacity for the additional solid waste that would be generated under ARS 2 (Gibbons 1996).

5.1.7 Transportation

ARS 2 would result in a small increase in traffic volume on and around MCAS Beaufort. Based upon projected net increases in station population, ARS 2 would create approximately 1,000 new daily automobile trips on station and regional roads. The following sections describe the implications of this relatively small increase in traffic loads.

5.1.7.1 Regional Road Network

Travel time on roads in the vicinity of MCAS Beaufort may be less than optimal. Specifically, sections of SC 280 currently operate at LOS F. However, this situation is more a result of the island geography of the region than a reflection of heavy traffic volumes. The majority of additional station population associated with the realignment of two FA-18 squadrons under ARS 2 is projected to live on the Port Royal Island portion of Beaufort County, primarily in residential areas south of the station in the vicinity of the City of Beaufort. This would alleviate some of the inconveniences associated with longer travel times.

As presented on Table 5.1-5 and Figure 5.1-4, traffic volumes on roadways directly servicing the station have adequate capacity to handle projected traffic volumes. The realignment of two F/A-18 squadrons would contribute an insignificant amount of traffic to the daily traffic volumes. However, a degradation of LOS on SC 280 (between SC 170 to US 21) is expected to result from the additional traffic loading. This degradation of LOS from C

Table 5.1-5

PROJECTED TRAFFIC CONDITIONS FOR THE AREA SURROUNDING MCAS BEAUFORT UNDER ARS 2

Roadway	Segment	AADT Without Proposed MCAS Beaufort Realignment	LOS	AADT Including Proposed MCAS Beaufort Realignment	LOS
U.S. 21	S 71 to S 38	12,520	A	12,760	A
U.S. 21	SC 116 to S71	18,476	A	18,716	A
U.S. 21	SC 280 to SC 116	28,200	B	29,700	B
U.S. 21	SC 170 to SC 280	28,807	B	29,808	B
SC 116	Laurel Bay Family Housing Area to U.S. 21	8,265	B	8,525	B
SC 170	SC 280 to US 21	21,393	F	21,593	F
SC 280	SC 23 to SC 170	16,288	F	16,386	F
SC 280	SC 170 to U.S. 21	12,844	C	13,184	D

Key:

A = Free flow conditions.
AADT = Annual Average Daily Traffic.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds, however low manueverability.
E = Traffic at capacity of segment, unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no manueverability.
LOS = Level of service.

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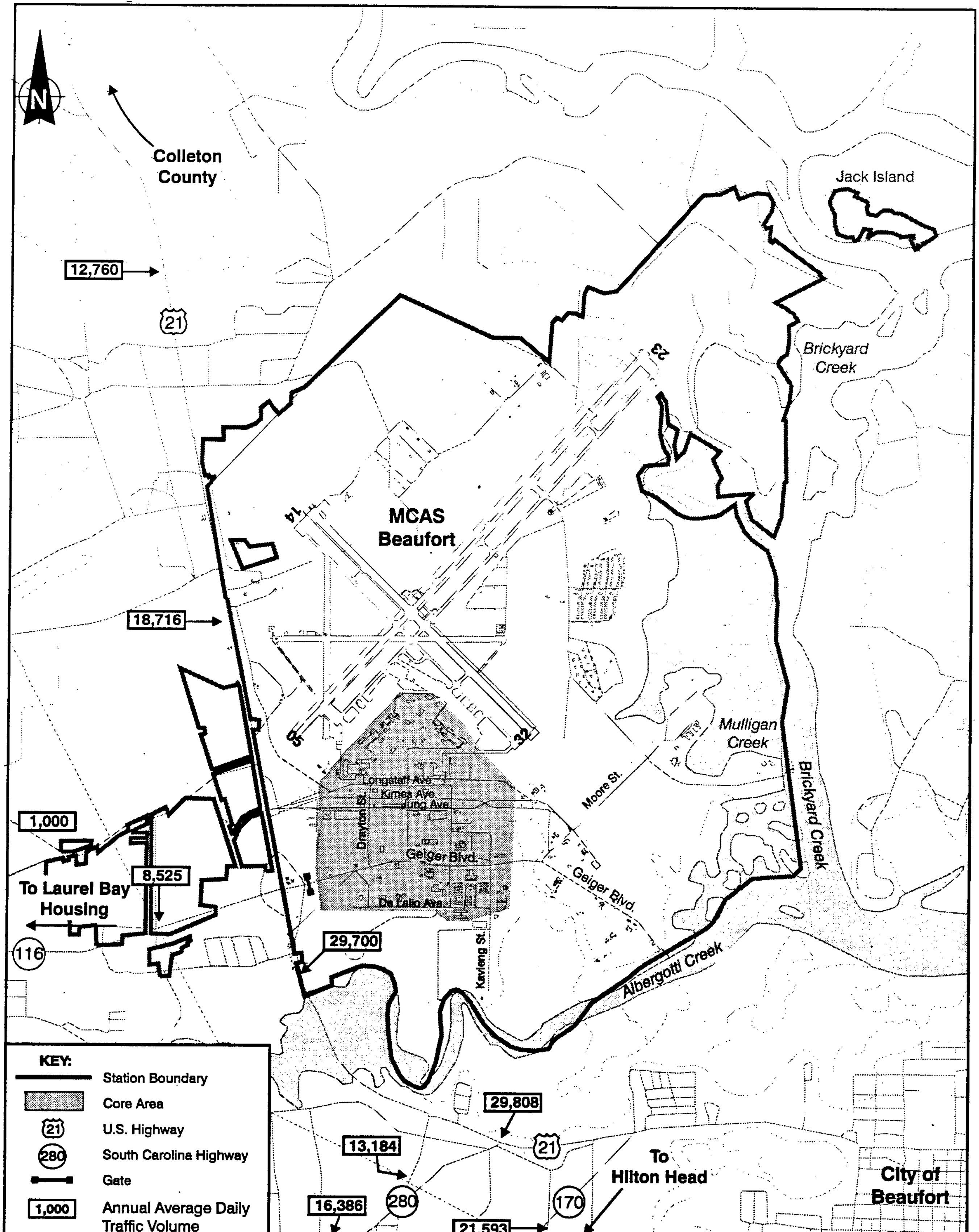


SOURCE: SCDOT 1996

SCALE
0 1,075 2,150 Meters
0 3,527 7,054 Feet

Figure 5.1-4 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING MCAS BEAUFORT FOLLOWING REALIGNMENT UNDER ARS 2

to D is primarily due to existing traffic flow. Although ARS 2 would result in additional traffic on these thoroughfares, actual impact on transportation would be, in most cases, negligible because the influx of traffic would be small relative to the existing traffic flows. Baseline traffic growth (i.e., without proposed realignment activities under ARS 2) of approximately 5% is projected for the region, and will cause an increase in traffic utilizing roads in the vicinity of the station.

The effects of traffic generated by the realignment added to these projected loads would vary across different road segments in the area. Traffic utilizing U.S. 21 and SC 116 would not experience any degradation in LOS as a result of ARS 2. Traffic volumes on roadways to the southwest of the station (SC 170 and SC 280) would cause a drop in service from 1997 levels (see Section 3.2.7). This degradation is caused primarily by projected regional growth as opposed to modest increases associated with ARS 2. These roads are two-lane, rural highways which connect eastern Port Royal Island with the popular tourist destination of Hilton Head Island and developed areas to the south.

5.1.7.2 Station Road Network

Projected traffic resulting from ARS 2 would not significantly impact the operation of the on-station roadway network. This network has sufficient excess capacity to accommodate additional traffic that would be generated under ARS 2.

5.1.7.3 Planned Road Improvements

Planned improvements to the existing regional roadway system should alleviate existing and projected congested areas (Land Ethics, Inc. 1996). There are plans to expand the SC 170 corridor to a four-lane divided highway. Deficient segments of U.S. 21 are also identified for future expansion. These projects would provide sufficient additional capacity to accommodate projected regional population growth, including the modest growth associated with ARS 2.

5.1.8 Noise

Long-term increases in noise exposure levels around MCAS Beaufort would occur as a result of increased aircraft operations associated with ARS 2. These noise increases would result in significant impacts on people living near the air station.

The Navy has conducted an aircraft noise study to examine the impacts resulting from potential realignment of F/A-18 squadrons to MCAS Beaufort (Wyle Labs 1997). As with

previous noise studies conducted at the station, this study involved the use of DoD's NOISE-MAP model to project Ldn contours in 1999, when realignment at the station would be completed. To maintain consistency with the last AICUZ study (1994) and the characteristics of station operation, average busy day (ABD) operations were used for the analysis. Figure 5.1-5 depicts projected 1999 ABD Ldn contours compared to the existing AICUZ contours. As shown, both the 65 to 75 dB and the 75 and greater Ldn contours change in configuration and cover greater areas than the respective AICUZ contours.

Table 5.1-6 compares the estimated area and population within the 1994 AICUZ and projected 1999 noise contours. The projected 1999 65 to 75 dB noise contour for ARS 2 would cover an area of 11,235 acres (4,547 hectares), with an estimated population of 3,816 people. The 75 dB or greater contour would cover an area of 2,776 acres (1,123 hectares), with an estimated population of 859 persons (Wyle Labs 1997). While both these areas/ populations would be relatively large increases from the 1994 AICUZ areas, it should be noted that in 1994 MCAS Beaufort experienced one of the lowest levels of aircraft operations in its history. Table 5.1-7 presents the decrease in area and population noise exposure relative to the 1994 AICUZ. An estimated population of 250 people would experience a reduction in noise levels due to existing flight tracks and runway utilization.

Sensitive noise receptors are shown on Figure 5.1-5. No schools are located in the projected 65 Ldn or greater contour. However, Beaufort County is considering two sites for new school construction. At one of the school sites, noise exposure would be 64 dB Ldn (60 Leq) under ARS 2. Assuming 25 dB attenuation with air conditioning operating and windows closed, the interior noise exposure should be less than 45 dB with no additional sound attenuation necessary.

A detailed discussion on noise level changes and projected environmental impacts is presented in Section 4.8. The maximum sound levels of typical F/A-18 events that would be conducted at MCAS Beaufort are shown in Table 5.1-8. The anticipated number of busy day operations by event is presented in Table 5.1-9.

The noise contours presented in Figure 5.1-5 are based upon current operating procedures of MCAS Beaufort. The station continually evaluates noise mitigation options to reduce the noise impacts on the local community. These include an evaluation of:

- Arrival and departure procedures;
- Airfield hours of operation;
- Pattern altitudes;

Table 5.1-6

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1994 AICUZ AND PROJECTED 1999 NOISE CONTOURS MCAS BEAUFORT - ARS 2

Ldn	1994 AICUZ		1999 Noise Contours		New Area/Population Exposed Relative to 1994 AICUZ[a]	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	8,409 (3,403)	2,847	11,235 (4,547)	3,816	4,983 (2,017)	1,659
75 dB or greater	1,028 (416)	317	2,776 (1,123)	859	2,071 (838)	644
Total	9,437 (3819)	3,164	14,011 (5,670)	4,675	7,054 (2,855)	2,303

Note: Numbers exclude water areas.

a Represents only new area/population that previously were not exposed to listed noise levels under 1994 AICUZ. Does not equal the difference between 1994 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.

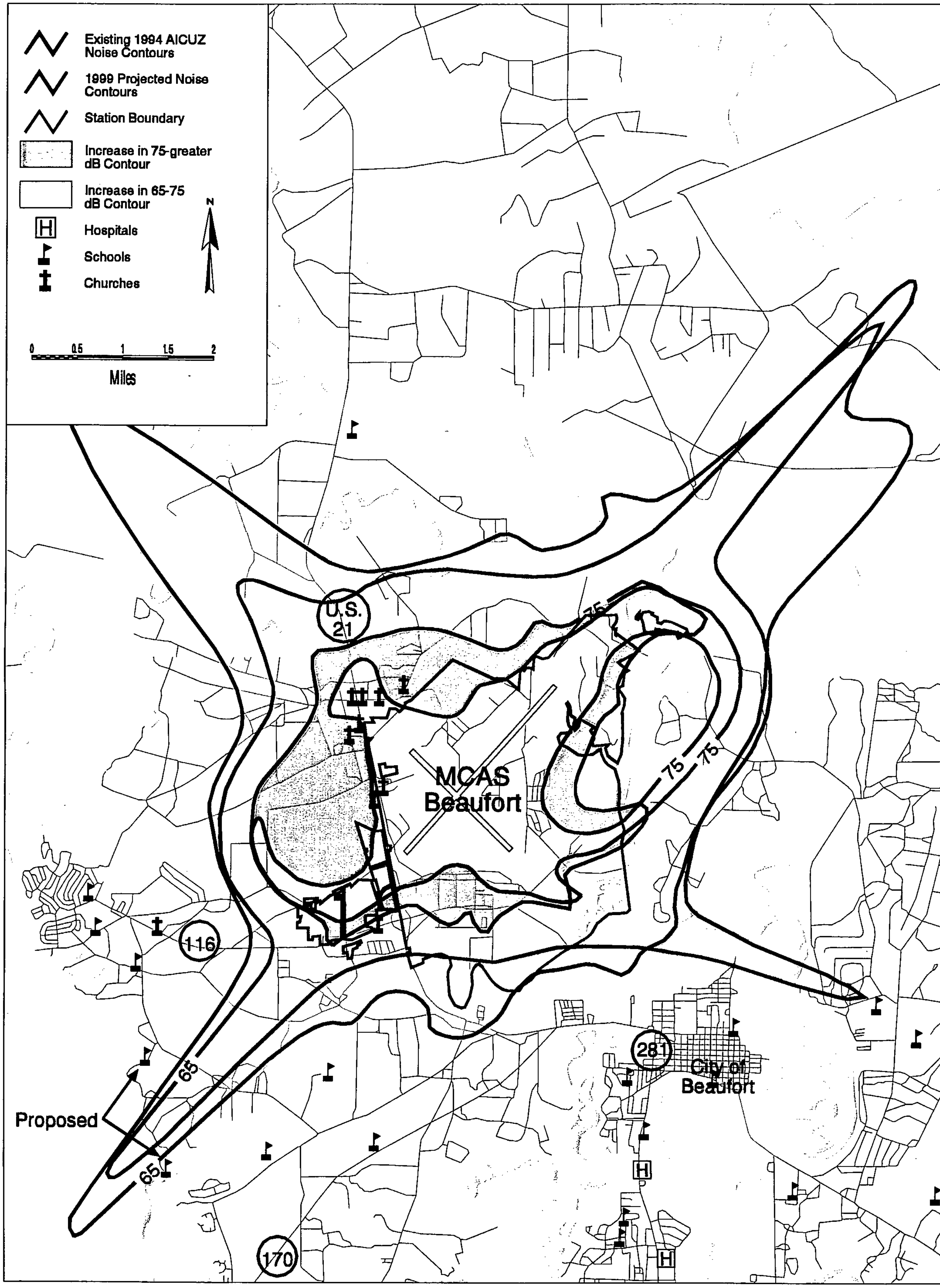
Table 5.1-7

DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE
RELATIVE TO 1994 AICUZ
MCAS BEAUFORT-ARS 2

Reduction in Ldn	Area in Acres (Hectares)	Estimated Population
75+ to 65 - 75 dB	-323 (-131)	-104
65 - 75 to <65 dB	-409 (-166)	-146
Total	-732 (-296)	-250

Key:

Ldn = Day-night average sound level.



Source: SOUTHDIV 1994, Wyle Labs 1997

Figure 5.1-5
ARS 2 - Comparison of Existing and Projected 1999 Average Busy Day Noise Contours
MCAS Beaufort

Table 5.1-8 **F/A-18 MAXIMUM SOUND LEVELS AT RECEPTOR WITH AIRCRAFT AT 1,000 FEET AGL (decibels)**	
Departures	108
Arrivals	104
Touch-and-go	97
FCLP	97

Table 5.1-9

PROJECTED AVERAGE BUSY DAY OPERATIONS FOR SELECTED SORTIES

	Project Increase Under ARS 2	Total Marine Corps/Navy F/A-18s
Departures	12	58
Arrivals	12	58
Touch-and-go[a]	13	23
FCLP[a]	12	38

a Touch-and-go and FCLP sorties equal two operations each.

- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

MCAS Beaufort would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation.

5.1.9 Air Quality

5.1.9.1 Air Quality Regulations

Air quality is governed by the Clean Air Act and its implementing regulations. The primary regulations affecting ARS 2 at MCAS Beaufort are the NAAQS. The station is

located in AQCR3-Coastal and is designated attainment for all pollutants. The rest of South Carolina is also designated attainment for all pollutants.

The baseline year for data from MCAS Beaufort is 1997 (Wyle Labs 1997). Actual 1995 stationary source emission inventory data were projected to remain valid for 1997 because only minor operational changes were projected to occur between 1995 and 1997. These minor changes would not affect emission levels.

5.1.9.2 General Conformity Rule

As discussed in Section 3.2.9.2, and above the entire State of South Carolina is classified as attainment for all criteria pollutants. Therefore, the air quality effects of ARS 2 at MCAS Beaufort are exempt from the General Conformity Rule. While slight increases in air pollutant emissions are projected at the station, these would represent insignificant impacts and would be consistent with the goals and objectives of the South Carolina SIP.

5.1.9.3 Projected Emissions at MCAS Beaufort

The implementation of ARS 2 would result in slight increases in air pollutant emissions, primarily associated with increased aircraft operations and maintenance activities at the station. Table 5.1-10 presents projected 1999 air emissions at MCAS Beaufort associated with ARS 2. The following discusses the sources of these projected emissions.

Aircraft Operations

An increase in air pollutant emissions would occur primarily due to increased flight operations at MCAS Beaufort for the two additional F/A-18 squadrons under ARS 2. Projected 1999 aircraft operations (Wyle Labs 1997) and emission factors and methods described in Appendix E were used to project these emissions. Emissions were estimated to be 138 tons per year of VOCs, 96 tons per year of NO_x, 387 tons per year of CO, 4 tons per year of SO_2, and 56 tons per year of PM_{10}.

Other Mobile Sources

In-frame engine maintenance run-up emissions are based on the number of projected tests modeled in noise studies (Wyle Labs 1997). Emissions were estimated to be 10 tons per year of VOC, 16 tons per year of NO_x, 25 tons per year of CO, 0.5 ton per year of SO_2, and 6 tons per year of PM_{10}.

Table 5.1-10

PROJECTED 1999 AIR EMISSIONS SUMMARY FOR MCAS BEAUFORT UNDER ARS 2
(tons per year)

Source Type	VOCs	NO_x	CO	SO_2	PM_{10}
Mobile Sources					
Aircraft	138.28	95.99	386.72	4.05	56.17
Other Mobile Sources					
Maintenance run-ups	9.70	15.58	24.61	0.48	5.80
Total Mobile and Other Mobile	147.97	111.58	411.33	4.53	61.97
Stationary Sources					
Boilers	0.18	9.89	2.14	13.00	1.32
Generators	1.29	6.14	26.46	0.40	0.43
Engine test cells	8.52	48.59	104.80	2.67	8.54
JP-5 storage tanks	4.63	0.00	0.00	0.00	0.00
Degreasing	11.42	0.00	0.00	0.00	0.00
Painting	4.54	0.00	0.00	0.00	0.09
Open burn/detonation	0.08	0.03	0.08	0.00	0.07
Carpentry	0.00	0.00	0.00	0.00	0.48
Total Stationary	30.66	64.65	133.48	16.07	10.93
Total	178.64	176.23	544.81	20.60	72.90

Key:

CO = Carbon monoxide.
NO_x = Oxides of nitrogen.
PM_{10} = Particulate matter.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compound.

Stationary Sources

MCAS Beaufort's Title V operating permit will, upon approval, govern emissions from stationary sources. The station's air emission inventory that supported this permit included projections of future emissions associated with the addition of two F/A-18 squadrons at the station (Radian 1994). The Title V permit will allow for operations that would generate additional emissions. Therefore, projected increases associated with ARS 2 would not require an amendment of the station's operating permit.

Some stationary-source emissions at MCAS Beaufort would increase slightly compared to existing emission levels as a result of ARS 2. Engine testing (at out-of frame test cells), JP-5 fuel handling, and degreasing and painting emissions are projected to increase. VOCs were estimated at 31 tons per year, NO_x at 65 tons per year, CO at 133 tons per year, SO_2 at 16 tons per year, and PM_{10} at 11 tons per year. These emission projections were obtained from the station's air emission inventory (Radian 1994), Title V permit application (Radian 1996), and projections of engine testing requirements (Wyle Labs 1997).

5.1.9.4 Total Projected Emissions

The net change in emissions from 1997 to 1999 is shown in Table 5.1-11. Emissions would increase 37 tons per year for VOCs, 39 tons per year for NO_x, 91 tons per year for CO, 1 ton per year for SO_2, and 19 tons per year for PM_{10}. These emission increases are minor when compared with allowable emission increases for stationary source permitting in attainment areas. Generally, stationary sources emitting these pollutant quantities are not subject to rigorous air quality permitting because these emission quantities are assumed to not significantly affect air quality in the region surrounding the station.

5.1.10 Topography, Geology, and Soils

5.1.10.1 Topography

The proposed construction and operations under ARS 2 would not impact the region's topography.

5.1.10.2 Geology

The proposed construction and operations under ARS 2 would not impact the geologic resources underlying the station.

Table 5.1-11

NET CHANGE IN AIR EMISSIONS BETWEEN 1997 AND 1999 AT MCAS BEAUFORT - ARS 2 (tons per year)

Year	VOCs	NO_x	CO	SO_2	PM_{10}
MCAS Beaufort					
1997	142.00	137.55	454.10	19.21	54.29
1999	178.64	176.23	544.81	20.60	72.90
Net Change					
1997 to 1999	36.64	38.68	90.70	1.39	18.61

Key:

CO = Carbon monoxide.
NO_2 = Oxides of nitrogen.
PM_{10} = Respirable particulate.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compound.

5.1.10.3 Soils

The overall impact on soils at the proposed project site under ARS 2 would be minor and due primarily to short-term construction activities. Temporary impacts on soils would be associated only with the proposed MF Pad and would include compaction and rutting by vehicular traffic, and potential erosion of soils during the construction phase of the project. These impacts will be lessened by employing standard soil erosion and sedimentation control measures during construction, consistent with the South Carolina Erosion and Sediment Reduction Act and OCRM requirements.

5.1.11 Water Resources

5.1.11.1 Surface Water

Implementation of ARS 2 would not result in significant adverse effects to water quality. The majority of proposed apron alterations would occur in portions of the station that are already paved and would not affect streams located on the station property. Minor, temporary impacts could occur from the construction of the proposed MF Pad, primarily associated with potential runoff of soils into drainages near the flight line during the construction phase of the project. Following completion of the project and stabilization of lands

immediately surrounding the project area, the potential for these types of impacts would subside.

Potential surface water quality impacts may result from runoff from facilities and aircraft support areas. Increases in contamination from oil, grease, metals, and particulates from apron and hangar areas would potentially occur. Management of point and nonpoint pollution sources would be accomplished by implementation of Stormwater Management Guidelines administered by the South Carolina OCRM. These guidelines identify the drainage requirements that must be met in the coastal zone in order to reduce or eliminate the damaging effects of stormwater runoff (SOUTHDIV 1994). Proper management of storm-water runoff will assist in the attainment and maintenance of water quality standards, reduce local flooding, and reduce the effects of erosion on land and in stream channels.

5.1.11.2 Groundwater

The area's groundwater resources are not expected to be affected under ARS 2. The availability of groundwater in the area or the quality of the water withdrawn would not be affected. Although recharge of the Floridan Aquifer occurs on MCAS Beaufort, an increase in impervious surface areas resulting from the proposed parking apron alterations under ARS 2 is insignificant and would not significantly decrease the amount of water recharged into the Floridan Aquifer.

5.1.11.3 Wetlands

The proposed parking apron alterations under ARS 2 would occur in developed portions of the station. Wetlands on the station would not be affected by the proposed construction or operation activities.

5.1.12 Terrestrial Environment

5.1.12.1 Vegetation

Proposed parking apron alterations at MCAS Beaufort under ARS 2 would not significantly affect vegetation at the station. The majority of the apron alterations would occur in paved areas. The construction of the proposed MF Pad would result in the loss of approximately 8 acres of planted pine forest near the flight line. Given the extent of existing forestry resources at the station, this effect is not considered significant.

5.1.12.2 Wildlife

Proposed construction at MCAS Beaufort under ARS 2 would result in minor impacts on wildlife resources. Most of the areas proposed for development currently provide no habitat for wildlife. Specifically, the removal of forested areas associated with construction of the proposed MF Pad would result in potential mortality of less-mobile forms of wildlife such as amphibians, reptiles, and small mammals that are unable to escape the construction area. However, the few individual wildlife species that inhabit this area would disperse into the similar woodland habitat surrounding this project area.

5.1.12.3 Threatened and Endangered Species

Threatened or endangered species identified on the station occur in areas beyond the limits of the proposed construction under ARS 2. No effect to threatened or endangered species would result from the proposed construction or air operation activities.

5.1.13 Cultural Resources

5.1.13.1 Archaeological Resources

Proposed construction under ARS 2 will not result in any impacts to archaeological resources at MCAS Beaufort that are on the NRHP or are NRHP-eligible. Project locations occur primarily on significantly disturbed areas (i.e., paved) and would not involve excavation. Further, the location for the proposed MF Pad has been previously surveyed for intact resources, no NRHP-eligible resources were encountered on the site (New South Associates 1992).

5.1.13.2 Architectural Resources

The proposed project associated with ARS 2 would involve alterations to Building 729. Building 729 has not been evaluated for NRHP eligibility. However, evaluation in compliance with Section 106 of the National Historic Preservation Act will be conducted prior to any renovation work. Construction projects under ARS 2 would be limited to parking apron alterations only; no buildings would require alteration to implement the alternative.

5.1.14 Environmental Contamination

5.1.14.1 Hazardous Materials and Waste Management

With the addition of two squadrons of F/A-18 aircraft at MCAS Beaufort under ARS 2, it is projected that more hazardous waste would be generated at the station. It is estimated that the hazardous waste generation would increase by 7,600 lbs., which is a 7% increase over the hazardous waste generated in 1995. This increase can be accommodated within existing hazardous waste management systems.

5.1.14.2 Installation Restoration Program Sites

Existing IRP sites at MCAS Beaufort would not be affected by the proposed construction or operations associated with ARS 2.

5.2 Environmental Consequences of ARS 2 and Mitigation Measures: NAS Oceana

5.2.1 Airfield Operations

Airfield operations at NAS Oceana under ARS 2 would be slightly less than those experienced under ARS 1. Table 5.2-1 presents projected airfield operations for ARS 2, derived from the NASMOD analysis for the station (ATAC 1997). A total of 227,000 annual operations would be conducted at NAS Oceana. This represents a 109% increase over 1997 operations. At NALF Fentress, projected operations would grow to 150,000, a 43% increase over 1997 levels. As with ARS 1, these operations could be reasonably accommodated at each of these facilities (ATAC 1997). Operations associated with ARS 2 would be approximately 5% lower than ARS 1.

5.2.2 Military Training Areas

5.2.2.1 Military Training Routes

Projected operations and noise levels in Ldnmr associated with ARS 2 are presented in Table 5.2-2. There would be an approximately 9% increase in total MTR operations as a result of ARS 2. While projected noise levels for ARS 2 would be similar to those for ARS 1, aircraft operations in MTRs under ARS 2 would be slightly less than under ARS 1.

5.2.2.2 Warning Areas

Aircraft operations in warning areas adjacent to NAS Oceana under ARS 2 would be slightly less than under ARS 1 (see Table 5.2-3). As under ARS 1, the overall operational efficiency of these airspace components would not be adversely impacted by implementation of ARS 2 (ATAC 1997).

5.2.2.3 Military Operating Areas

Aircraft operations in the Stumpy Point MOA under ARS 2 would be similar to those for ARS 1 (see Table 5.2-4). Projected annual operations would drop from 56 to 36.

5.2.2.4 Restricted Areas

Aircraft operations in restricted areas adjacent to NAS Oceana under ARS 2 would be slightly less than under ARS 1 (see Table 5.2-5). As under ARS 1, the overall operational efficiency of these areas would not be impacted by implementation of ARS 2 (ATAC 1997).

Table 5.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 2

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
F-14 Fleet	Departure	13,225	12,087	1,164	13,251	
	Full Stop Visual Landing	12,700	11,257	1,450	12,707	
	Full Stop Instrument Landing	514	357	177	534	
	Visual Touch-and-Go/Low Approach	20,396	20,568	940	21,508	
	Instrument Touch-and-Go/Low Approach	570	474	64	538	
	Field Carrier Landing Practice	0	976	320	1,296	
	TOTAL	**47,405**	**45,719**	**4,115**	**49,834**	
F-14 FRS	Departure	6,947	6,495	460	6,955	
	Full Stop Visual Landing	6,308	5,895	418	6,313	
	Full Stop Instrument Landing	639	282	360	642	
	Visual Touch-and-Go/Low Approach	27,456	25,470	890	26,360	
	Instrument Touch-and-Go/Low Approach	5,234	3,682	1,538	5,220	
	Field Carrier Landing Practice	0	50	130	180	
	TOTAL	**46,584**	**41,874**	**3,796**	**45,670**	
F/A-18 Fleet	Departure	0	12,048	1,024	13,072	
	Full Stop Visual Landing	0	10,592	1,478	12,070	
	Full Stop Instrument Landing	0	700	315	1,015	
	Visual Touch-and-Go/Low Approach	0	20,996	1,760	22,756	
	Instrument Touch-and-Go/Low Approach	0	1,854	658	2,512	
	Field Carrier Landing Practice	**0**	**140**	**924**	**1,064**	
	TOTAL	0	46,330	6,159	52,489	

Table 5.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 2

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
F/A-18 FRS	Departure	0	8,137	416	8,553	
	Full Stop Visual Landing	0	6,907	652	7,559	
	Full Stop Instrument Landing	0	686	308	994	
	Visual Touch-and-Go/Low Approach	0	35,902	2,190	38,092	
	Instrument Touch-and-Go/Low Approach	0	4,520	570	5,090	
	Field Carrier Landing Practice	0	320	80	400	
	TOTAL	0	56,472	4,216	60,688	
Adversary	Departure	839	1,962	55	2,017	
	Full Stop Visual Landing	828	2,006	0	2,006	
	Full Stop Instrument Landing	5	10	1	11	
	Visual Touch-and-Go/Low Approach	436	1,530	0	1,530	
	Instrument Touch-and-Go/Low Approach	168	168	0	168	
	TOTAL	2,276	5,676	56	5,732	
Transient Jet	Departure	967	946	21	967	
	Full Stop Visual Landing	724	710	14	724	
	Full Stop Instrument Landing	243	241	2	243	
	Visual Touch-and-Go/Low Approach	1,078	1,020	22	1,042	
	Instrument Touch-and-Go/Low Approach	836	804	30	834	
	TOTAL	3,848	3,721	89	3,810	
Transient Prop	Departure	1,642	1,638	31	1,669	
	Full Stop Visual Landing	1,171	1,183	16	1,199	

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Table 5.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 2

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations: Day 0700-2200	Night 2200-0700	Total	Percent Change
	Full Stop Instrument Landing	471	462	8	470	
	Visual Touch-and-Go/Low Approach	2,890	2,878	52	2,930	
	Instrument Touch-and-Go/Low Approach	2,610	2,572	42	2,614	
	TOTAL	8,784	8,733	149	8,882	
	AIRFIELD TOTAL	108,897	208,525	18,580	227,105	109
NALF Fentress						
F-14 Fleet	Field Carrier Landing Practice	38,640	22,000	15,600	37,600	
F-14 FRS	Field Carrier Landing Practice	23,280	15,180	8,100	23,280	
F/A-18 Fleet	Field Carrier Landing Practice	0	14,360	7,860	22,220	
F/A-18 FRS	Field Carrier Landing Practice	0	19,232	4,960	24,192	
E-2 Fleet	Departure	168	98	70	168	
	Full Stop Visual Landing	168	98	70	168	
	Field Carrier Landing Practice	16,464	9,604	6,860	16,464	
E-2 FRS	Departure	616	476	140	616	
	Full Stop Visual Landing	616	476	140	616	
	Field Carrier Landing Practice	16,368	12,648	3,720	16,368	
C-2 Fleet	Departure	112	106	6	112	
	Full Stop Visual Landing	112	106	6	112	
	Field Carrier Landing Practice	8,124	7,828	296	8,124	
	AIRFIELD TOTAL	104,668	102,212	47,828	150,040	43

Source: ATAC 1997.

Table 5.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 2

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 2			% Change	1997 Ldmnr	1999 Ldmnr
			Day	Night	Total			
VR-0073	A-6	5	0	0	0		52	53
	AV-8B	199	496	4	500			
	EA-6B	39	38	1	39			
	F-14	61	28	0	28			
	F-15	601	589	12	601			
	F-16	72	72	0	72			
	F/A-18	6	6	0	6			
	T-38	4	4	0	4			
	Total	**987**	**1,223**	**17**	**1,250**	**27**		
VR-0085	AV-8B	0	34	1	35		<50	<50
	F-14	50	129	0	129			
	F-15	464	464	0	464			
	F-16	19	19	0	19			
	F/A-18	11	58	0	58			
	EA-6B	0	83	0	83			
	KC-130	0	32	0	32			
	Total	**544**	**819**	**1**	**820**	**51**		
VR-1040	A-10	9	9	0	9		52	52
	AV-8B	101	34	1	35			
	KC-130	28	32	0	32			
	EA-6B	78	83	0	83			
	F-14	0	129	0	129			
	F-16	520	520	0	520			
	F/A-18	18	58	0	58			
	Total	**754**	**865**	**1**	**866**	**15**		
VR-1043	A-6	405	0	0	0		55	<50
	AV-8B	64	24	0	24			
	KC-130	32	32	0	32			

Table 5.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES
AND NOISE LEVELS
ARS 2

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 2			% Change	1997 Ldmnr	1999 Ldmnr
			Day	Night	Total			
	EA-6B	74	74	0	74			
	F-15	28	28	0	28			
	F-16	115	115	0	115			
	F/A-18	37	37	0	37			
	Total	**755**	**310**	**0**	**310**	**-59**		
VR-1046	A-10	9	9	0	9		57	50
	A-6	363	0	0	0			
	AV-8	78	242	2	244			
	EA-6B	37	21	16	37			
	F-15	41	41	0	41			
	F-16	9	9	0	9			
	F/A-18	92	308	20	328			
	F-4	9	9	0	9			
	T-2	4	4	0	4			
	Total	**642**	**643**	**38**	**681**	**6**		
VR-1752	A-4	5	5	0	5		50	<50
	A-6	179	0	0	0			
	AV-8B	6	34	1	35			
	C-17	1	1	0	1			
	KC-130	10	32	0	32			
	EA-6B	167	83	0	83			
	F-111	5	5	0	5			
	F-14	19	129	0	129			
	F-15	191	183	8	191			
	F-16	3	3	0	3			
	F/A-18	23	58	0	58			
	TA-4	3	3	0	3			
	Total	**612**	**536**	**9**	**545**	**-11**		

Table 5.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 2

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 2			% Change	1997 Ldmnr	1999 Ldmnr
			Day	Night	Total			
VR-1753	A-6	418	0	0	0		51	51
	AV-8B	34	32	2	34			
	C-2	7	7	0	7			
	EA-6B	27	25	2	27			
	F-14	280	734	0	734			
	F-15	144	142	2	144			
	F-16	174	170	4	174			
	F/A-18	8	571	72	643			
	S-3	2	2	0	2			
	Total	1,094	1,683	82	1,765	61		
VR-1754	A-6	134	0	0	0		<50	<50
	CH-53	7	7	0	7			
	EA-6B	69	83	0	83			
	F-14	31	129	0	129			
	F-15	81	75	6	81			
	F-16	3	3	0	3			
	F/A-18	125	58	0	58			
	AV-8B	0	34	1	35			
	KC-130	0	32	0	32			
	Total	450	421	7	428	-5		
VR-1758	A-4	10	10	0	10		56	53
	A-6	448	0	0	0			
	AV-8B	22	34	1	35			
	B-1	7	7	0	7			
	B-52	1	1	0	1			
	EA-6B	139	83	0	83			
	F-14	125	129	0	129			
	F-15	188	184	4	188			

Table 5.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES
AND NOISE LEVELS
ARS 2

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 2			% Change	1997 Ldmnr	1999 Ldmnr
			Day	Night	Total			
	F-16	8	8	0	8			
	F/A-18	14	58	0	58			
	KC-130	0	32	0	32			
	Total	**962**	**546**	**5**	**551**	**-43**		
VR-1759	A-6	114	0	0	0		<50	<50
	AV-8B	17	34	1	35			
	EA-6B	11	83	0	83			
	F-14	27	129	0	129			
	F-15	9	9	0	9			
	F/A-18	3	58	0	58			
	KC-130	0	32	0	32			
	Total	**181**	**345**	**1**	**346**	**91**		
VR-1074	A-6	17	0	0	0		52	51
	AV-8B	196	330	2	332			
	EA-6B	34	34	0	34			
	F-14	8	8	0	8			
	F-15	403	403	0	403			
	F-16	12	12	0	12			
	F/A-18	16	16	0	16			
	Total	**686**	**803**	**2**	**805**	**17**		
IR-0714	A-6	74	0	0	0		<50	<50
	EA-6B	99	17	82	99			
	F/A-18	0	115	5	120			
	Total	**173**	**132**	**87**	**219**	**27**		
Total all MTRs		**7,840**	**8,326**	**250**	**8,576**	**9**		

Source: ATAC 1997; Wyle Labs 1997.

Table 5.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS ARS 2

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 2)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
TACTS Range							
F-14 (NAS Oceana Fleet)	2,869	47	2,916	2,048	26	2,074	
F-14 (NAS Oceana FRS)	543	0	543	543	0	543	
F/A-18 (NAS Oceana Fleet)	0	0	0	2,812	34	2,846	
F/A-18 (NAS Oceana FRS)	0	0	0	157	0	157	
Adversary Aircraft	612	14	626	1,433	19	1,452	
Air Force Jets	704	11	715	479	20	499	
Total	**4,728**	**72**	**4,800**	**7,472**	**99**	**7,571**	**58**
W-72 (exclusive of TACTS Range)							
F-14 (NAS Oceana Fleet)	2,942	58	3,000	3,809	61	3,870	
F-14 (NAS Oceana FRS)	2,739	0	2,739	2,783	0	2,783	
F/A-18 (NAS Oceana Fleet)	0	0	0	4,286	149	4,435	
F/A-18 (NAS Oceana FRS)	0	0	0	4,537	58	4,595	
F/A-18 (Marine Corps)	75	0	75	75	0	75	
KC-130 (MCAS Cherry Point FRS)	4	0	4	4	0	4	
Adversary Aircraft	121	0	121	522	0	522	
Other Navy Aircraft	2,771	204	2,975	2,769	206	2,975	
Air Force Jets	1,323	0	1,323	1,328	0	1,328	

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Table 5.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 2

User/Service Category	1997 Sorties Day (0700 - 2200)	1997 Sorties Night (2200 - 0700)	1997 Sorties Total	Projected 1999 Sorties (ARS 2) Day (0700 - 2200)	Projected 1999 Sorties (ARS 2) Night (2200 - 0700)	Projected 1999 Sorties (ARS 2) Total	Percent Change (Total)
Other Air Force Aircraft	69	41	110	70	40	110	
Coast Guard Aircraft	46	33	79	46	33	79	
Contractor	876	0	876	876	0	876	
Civilian	34	37	71	34	37	71	
Total	**11,000**	**373**	**11,373**	**21,139**	**584**	**21,723**	**91**
W-386 A/B							
F-14 (NAS Oceana Fleet)	0	0	0	88	0	88	
F-14 (NAS Oceana FRS)	14	0	14	15	0	15	
F/A-18 (NAS Oceana Fleet)	0	0	0	206	0	206	
F/A-18 (NAS Oceana FRS)	0	0	0	18	0	18	
F/A-18 (Marine Corps)	15	0	15	15	0	15	
Other Navy Aircraft	360	199	559	363	199	562	
Air Force Jets	3,308	0	3,308	3,452	0	3,452	
Other Air Force Aircraft	75	24	99	75	24	99	
Coast Guard Aircraft	17	2	19	17	2	19	
NASA (missile launches)	183	0	183	183	0	183	
Contractor	7	4	11	7	4	11	

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Table 5.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 2

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 2)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
Civilian	129	27	156	129	27	156	
Total	**4,108**	**256**	**4,364**	**4,568**	**256**	**4,824**	**11**
W-386 D							
F-14 (NAS Oceana Fleet)	275	5	280	317	0	317	
F-14 (NAS Oceana FRS)	684	0	684	684	0	684	
F/A-18 (NAS Oceana Fleet)	0	0	0	159	0	159	
Adversary Aircraft	0	0	0	0	0	0	
Air Force Jets	3	0	3	60	0	60	
NASA (missile launches)	183	0	183	183	0	183	
Total	**1,145**	**5**	**1,150**	**1,403**	**0**	**1,403**	**22**
W-122							
F-14 (NAS Oceana Fleet)	718	44	762	377	56	433	
F-14 (NAS Oceana FRS)	123	0	123	108	0	108	
F/A-18 (NAS Oceana Fleet)	0	0	0	397	20	417	
Adversary Aircraft	0	0	0	0	0	0	
F/A-18 (Marine Corps)	551	68	619	550	72	622	
AV-8 (Cherry Point Fleet)	2,130	32	2,162	2,129	35	2,164	
AV-8 (MCAS Cherry Point FRS)	1,316	0	1,316	1,311	0	1,311	

Table 5.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 2

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 2)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
EA-6B (MCAS Cherry Point Fleet)	1,606	15	1,621	1,606	15	1,621	
KC-130 (MCAS Cherry Point Fleet)	144	0	144	144	0	144	
KC-130 (MCAS Cherry Point FRS)	231	0	231	231	0	231	
Other Navy Aircraft	452	184	636	453	183	636	
Air Force Jets	4,852	573	5,425	4,844	584	5,428	
Other Air Force Aircraft	270	60	330	270	60	330	
Coast Guard Aircraft	40	4	44	40	4	44	
Contractor	34	9	43	33	10	43	
Civilian	774	63	837	774	63	837	
Total	13,241	1,052	14,293	13,267	1,102	14,369	<1

Source: ATAC 1997.

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Table 5.2-4 PROJECTED 1999 SORTIES IN THE STUMPY POINT MILITARY OPERATING AREA ARS 2					
		Projected 1999 Operations			
User/Service Category	1997 Total	Day (0700-2200)	Night (2200-0700)	Total	Percent Change
F-14 (NAS Oceana Fleet)	56	24	0	24	-57
F/A-18	0	12	0	12	NA
Total	56	36	0	36	-36

Key:

NAS = Naval Air Station.

Source: ATAC 1997.

5.2.3 Target Ranges

Projected sorties and noise levels in BT-9, BT-11, and the Dare County Range are presented in Table 5.2-6. With the exception of BT-9, which would have a noise level 1 dB lower (i.e., 61 dB in Ldnmr) than ARS 1, no changes in projected noise levels would occur under ARS 2 as compared to ARS 1.

5.2.3.1 BT-9 (Brant Island Shoal)

Projected operations and utilization rates at BT-9 under ARS 2 would be slightly less than ARS 1. Projected operations could be readily accommodated within published scheduled hours.

Land Use

The impacts of ARS 2 would be similar to those of ARS 1 (see Section 4.3.1)

Water Quality

The impacts of ARS 2 would be similar or of a lesser magnitude than those of ARS 1 (see Section 4.3.1).

Table 5.2-5

PROJECTED 1999 RESTRICTED AREA SORTIES AND NOISE LEVELS ARS 2

Restricted Area	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 2			% Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
			Day 0700-2200	Night 2200-0700	Total			
R-5306A (exclusive of BT-9 and BT-11)	A-10	30	31	0	31		<50	<50
	AH-1	136	136	0	136			
	AV-8B (Fleet)	1,021	1,046	8	1,054			
	AV-8B (FRS)	1,553	1,551	2	1,553			
	EA-6B	288	279	9	288			
	F/A-18 (Marine Corps)	91	91	0	91			
	F-15	56	58	0	58			
	F-16	212	206	4	210			
	F-16 (Air National Guard)	26	26	0	26			
	Other Jet	35	35	0	35			
	Other Prop	90	90	0	90			
	Total	3,538	3,549	23	3,572	1		
R-5306D	F/A-18	306	306	0	306		54	54
	AV-8B (Fleet)	562	568	4	572			
	KC-130 (Fleet)	22	22	0	22			
	KC-130 (FRS)	34	34	0	34			

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Table 5.2-5

PROJECTED 1999 RESTRICTED AREA SORTIES AND NOISE LEVELS
ARS 2

Restricted Area	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 2			% Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
			Day 0700-2200	Night 2200-0700	Total			
	AH-1	165	160	5	165			
	UH-1	305	300	5	305			
	CH-46	3,360	3,255	105	3,360			
	CH-53	1,370	1,300	70	1,370			
	Total	6,124	5,945	189	6,134	1		

Source: ATAC 1997; Wyle Labs 1997.

Table 5.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 2

Range	Aircraft Type	1997 Sorties			ARS 2 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 2 Ldnmr (dB)
		Day 0700-2200	Night 2200-0700	Total	Day 0700-2200	Night 2200-0700	Total			
BT-9	A-10	110	0	110	114	4	118		60	61
	AH-1	78	0	78	82	0	82			
	AV-8B (Fleet)	246	6	252	270	10	280			
	AV-8B (FRS)	25	0	25	49	0	49			
	EA-6B	13	0	13	13	0	13			
	CH-46	75	0	75	86	0	86			
	CH-53	9	2	11	13	0	13			
	F-14 (NAS Oceana Fleet)	68	0	68	192	22	214			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	52	0	52	62	2	64			
	F-16	380	8	388	408	8	416			
	F/A-18 (NAS Oceana Fleet)	0	0	0	204	24	228			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	190	10	200	194	14	208			
	H/UH-1	29	0	29	32	0	32			
	Army Helicopters[a]	74	8	82	90	8	98			
	Other Jet[b]	43	0	43	36	0	36			
	Other Prop[c]	20	0	20	19	0	19			
	Total BT-9	**1,679**	**62**	**1,741**	**2,131**	**120**	**2,251**	**29**		

Table 5.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 2

Range	Aircraft Type	1997 Sorties			ARS 2 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 2 Ldnmr (dB)
		Day 0700-2200	Night 2200-0700	Total	Day 0700-2200	Night 2200-0700	Total			
BT-11	A-10	120	0	120	104	2	106		68	69
	EA-6B	13	0	13	13	0	13			
	AH-1	107	0	107	103	0	103			
	AV-8B (Fleet)	1,162	36	1,198	1,110	30	1,140			
	AV-8B (FRS)	720	0	720	693	0	693			
	KC-130 (MCAS Cherry Point Fleet)	18	0	18	18	0	18			
	CH-46	123	0	123	112	0	112			
	CH-53	13	2	15	11	2	13			
	F-14 (NAS Oceana Fleet)	494	2	496	708	28	736			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	400	6	406	406	12	418			
	F-16	388	0	388	402	0	402			
	F-16 (Air National Guard)	198	0	198	212	0	212			
	F/A-18 (NAS Oceana Fleet)	0	0	0	1,188	74	1,262			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	362	22	284	364	26	390			
	H/UH-1	43	0	43	40	0	40			
	Army Helicopters[a]	80	8	88	72	0	72			
	Other Jet[b]	14	3	17	22	2	24			

Table 5.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 2

Range	Aircraft Type	1997 Sorties			ARS 2 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 2 Ldnmr (dB)
		Day 0700-2200	Night 2200-0700	Total	Day 0700-2200	Night 2200-0700	Total			
	Other Prop[c]	17	0	17	18	0	18			
	Total BT-11	**4,539**	**107**	**4,646**	**5,863**	**204**	**6,067**	**31**		
Dare County Range	A-10	14	0	14	20	0	20		65	65
	AV-8B (Fleet)	68	0	68	38	0	38			
	AV-8B (FRS)	10	0	10	8	0	8			
	EA-6B	5	0	5	5	0	5			
	F-14 (NAS Oceana Fleet)	2,986	38	3,024	2,618	56	2,674			
	F-14 (NAS Oceana FRS)	1,027	0	1,027	997	0	997			
	F-14 (Other Navy)	9	0	9	9	0	9			
	F-15	156	4	160	130	10	140			
	F-16	346	4	350	312	6	318			
	F-16 (Air National Guard)	498	26	524	490	20	510			
	F/A-18 (NAS Oceana Fleet)	0	0	0	1,346	160	1,506			
	F/A-18 (NAS Oceana FRS)	0	0	0	557	106	663			
	F/A-18 (Adversary)	12	0	12	24	0	24			
	F/A-18 (Other Navy)	53	0	53	53	0	53			
	F/A-18 (Marine Corps)	26	6	32	18	2	20			
	T-34[d]	0	0	0	27	0	27			
	F-15	1,305	102	1,407	1,305	102	1,407			
	F-16	401	4	405	401	4	405			

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Table 5.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 2

Range	Aircraft Type	1997 Sorties			ARS 2 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 2 Ldnmr (dB)
		Day 0700-2200	Night 2200-0700	Total	Day 0700-2200	Night 2200-0700	Total			
	A-10	44	0	44	44	0	44			
	AV-8B	81	0	81	81	0	81			
	EA-6B	1	0	1	1	0	1			
	F-14	63	0	63	63	0	63			
	F/A-18	1	0	1	1	0	1			
	OA-10	7	0	7	7	0	7			
	Total Dare County Range	**7,113**	**184**	**7,297**	**8,555**	**466**	**9,021**	**24**		

[a] Modeled as AH-64.
[b] Modeled as F/A-18.
[c] Modeled as C-130.
[d] Not modeled.

Source: ATAC 1997; Wyle Labs 1997.

Aquatic Resources

The impacts of ARS 2 would be similar or of a lesser magnitude than those of ARS 1 (see Section 4.3.1).

Air Quality

Projected emissions from aircraft operations below 3,000 feet AGL are shown in Table 5.2-7. Emissions were calculated using the same aircraft data to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 5.2-6. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet AGL. All emission increases are less than 1 ton per year and would not affect air quality in the area.

5.2.3.2 BT-11 (Piney Island)

Projected aircraft operations and utilization rates at BT-11 under ARS 2 would be slightly less than under ARS 1. Projected operations could be accommodated within published operating hours of the range.

Land Use

Land use impacts under ARS 2 would be similar to those under ARS 1 (see Section 4.3.2).

Water Quality

Impacts under ARS 2 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Aquatic Resources

Impacts under ARS 2 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Terrestrial Resources

Impacts under ARS 2 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Table 5.2-7

PROJECTED EMISSIONS - BT-9 ARS 2

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	15	0.0010	0.0240	0.0029	0.0006	0.0055
F/A-18	35	0.0093	0.0451	0.0231	0.0010	0.0112
AV-8	313	0.0237	0.1756	0.1701	0.0085	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	118	0.0072	0.0187	0.0583	0.0016	0.0084
F-16	24	0.0003	0.0289	0.0030	0.0004	0.0006
F-15	4	0.0000	0.0045	0.0005	0.0001	0.0001
All Helicopters	311	0.1075	0.2583	1.0271	0.0343	0.0000
Other Jets	18	0.0011	0.0004	0.0082	0.0001	0.0008
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**848**	**0.1526**	**0.5588**	**1.2982**	**0.0468**	**0.0265**
Net Change	**113**	**0.0203**	**0.0907**	**0.1579**	**0.0061**	**0.0075**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all Helicopter operations are below 3,000 ft.

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Air Quality

Projected emissions from aircraft operations below 3,000 feet AGL are shown in Table 5.2-8. Emissions were calculated using the same aircraft data to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 5.2-8. Emissions of NO_x and PM_{10} slightly increase while emissions of VOC, CO, and SO_2 slightly decrease. Although there is a very small decrease in total annual operations below 3,000 feet AGL. However, although individual aircraft models emitting the majority of NO_x and PM_{10} operate more frequently than in the existing condition, the net change for these pollutants is minimal. All emission increases are less than 1 ton per year and would not affect air quality in the area.

5.2.3.3 Dare County Range

Projected aircraft operations and utilization rates at the Dare County Range would be slightly less under ARS 2 than under ARS 1. These operations could be conducted within published operating hours.

Land Use

Land use impacts under ARS 2 would be similar to those under ARS 1 (see Section 4.3.3).

Water Quality

Impacts under ARS 2 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Aquatic Resources

Impacts under ARS 2 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Terrestrial Resources

Impacts under ARS 2 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Table 5.2-8

PROJECTED EMISSIONS - BT-11 ARS 2

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	46	0.0032	0.0754	0.0090	0.0020	0.0174
F/A-18	96	0.0255	0.1233	0.0632	0.0027	0.0305
AV-8	1,741	0.1318	0.9785	0.9479	0.0473	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	106	0.0065	0.0168	0.0524	0.0014	0.0075
F-16	37	0.0004	0.0435	0.0045	0.0006	0.0008
F-15	25	0.0003	0.0296	0.0030	0.0004	0.0006
All Helicopters	340	0.1175	0.2824	1.1229	0.0375	0.0000
Other Jets	12	0.0007	0.0003	0.0055	0.0001	0.0006
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**2,413**	**0.2884**	**1.5530**	**2.2134**	**0.0923**	**0.0574**
Net Change	**-47**	**-0.0013**	**0.0306**	**-0.1232**	**-0.0039**	**0.0249**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all Helicopter operations are below 3,000 ft.
KC-130 operations ignored because aircraft not expected to descend below 3,000 ft. AGL since it is an in-flight refueling aircraft.

Air Quality

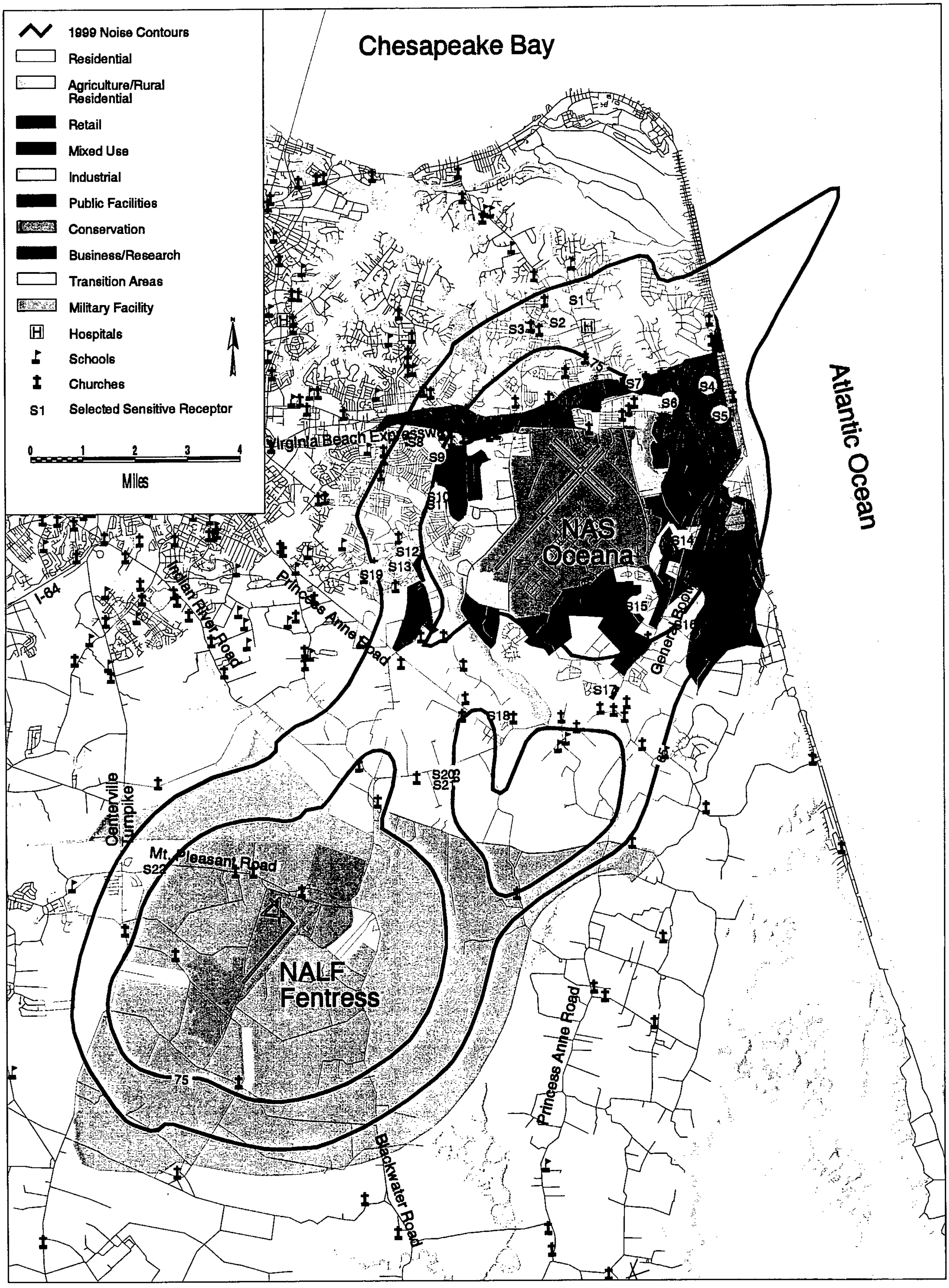
A slightly different mix of aircraft models use the Dare County range compared to BT-9 and BT-11. Projected emissions from aircraft operations below 3,000 feet AGL are shown in Table 5.2-9. Emissions were calculated using the same aircraft data to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 5.2-9. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet AGL. All emission increases are less than 1 ton per year and would not affect air quality in the area.

5.2.4 NAS Oceana and NALF Fentress Land Use

The impacts of construction at NAS Oceana under ARS 2 would be similar to those discussed for ARS 1 (see Section 4.4).

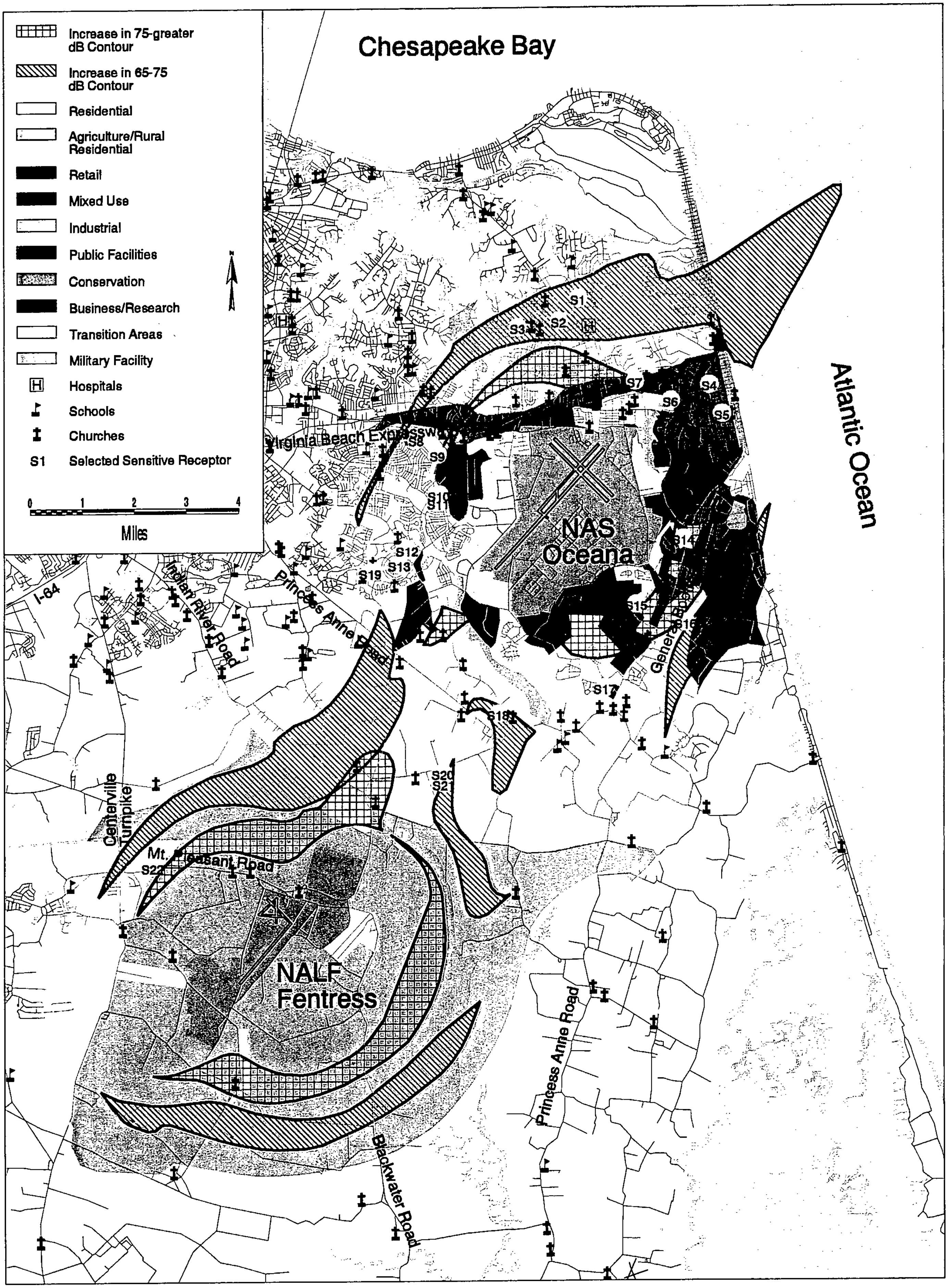
With regard to the station's AICUZ program, the noise impacts would be slightly less than those associated with ARS 1. Figure 5.2-1 presents projected 1999 noise contours and land use. Figure 5.2-2 presents the increase between 1978 AICUZ noise contours and projected 1999 noise contours and land use. Implementation impacts of ARS 2 would be greater than those under the current 1978 AICUZ, but less than those under ARS 1.

With regard to APZs under the AICUZ program, implementation of ARS 2 would result in impacts similar to, but slightly less than, those under ARS 1. The realignment of two F/A-18 fleet squadrons to MCAS Beaufort would reduce the operational tempo at NAS Oceana such that selected flight tracks may not have sufficient operations to warrant application of APZs. Figure 5.2-3 presents projected 1999 APZs, and Figure 5.2-4 presents the increases/decreases between 1978 and projected 1999 APZs (see also Table 5.2-10). Under ARS 2, 33,094 acres (13,393 hectares) would be within APZs for NAS Oceana and NALF Fentress, a 1,529-acre (618-hectare) decrease from ARS 1. The decrease is due to a reduction in APZ 1 and APZ 2 for Runway 5 at NAS Oceana. The APZs for NALF Fentress would be the same as under ARS 1. Figure 5.2-5 shows the increase between 1997 and 1999 APZs and land use for NAS Oceana.



Source: Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

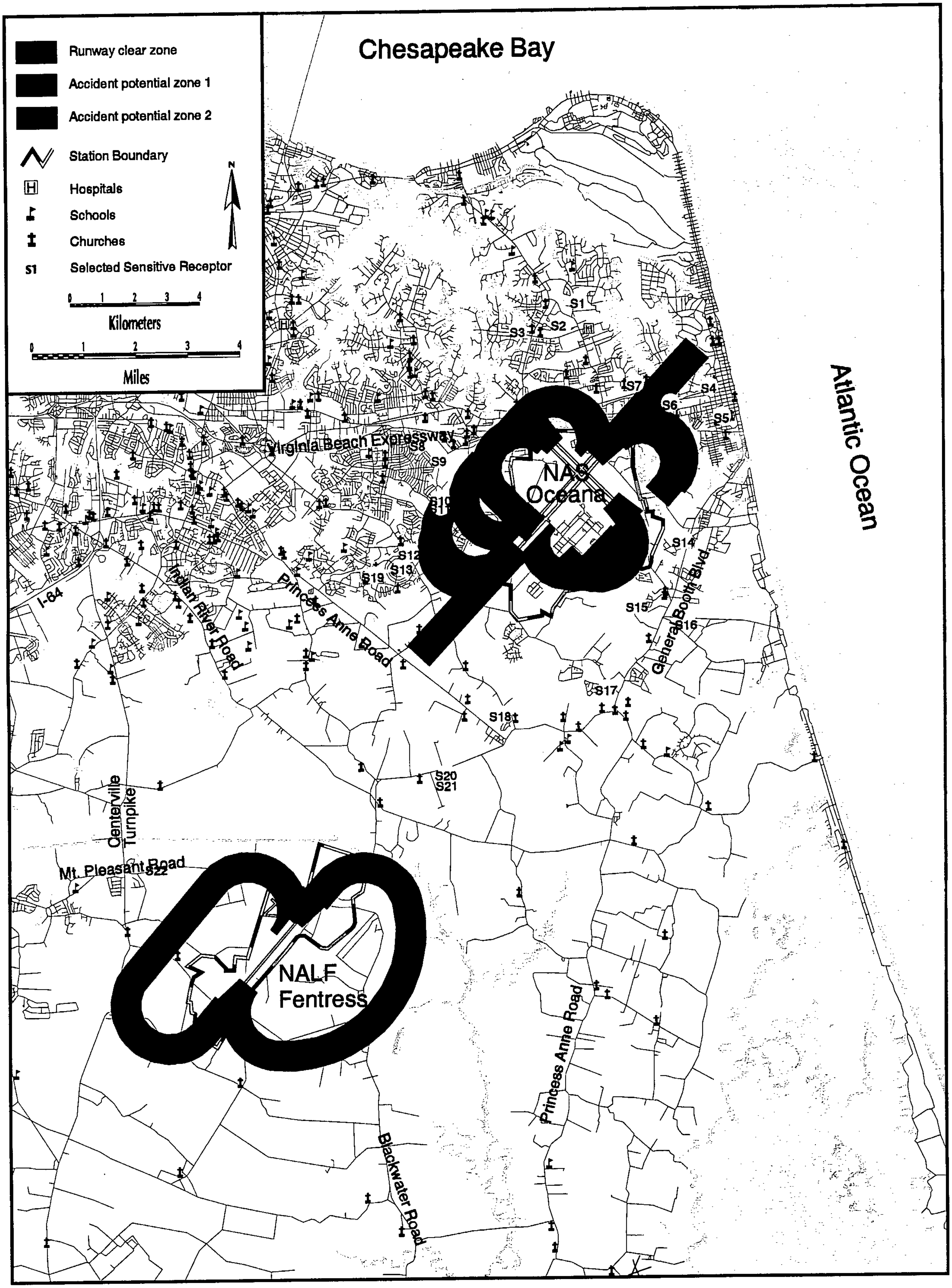
Figure 5.2-1
ARS 2 - Projected 1999 Noise Contours and Land Use
NAS Oceana



Source: U.S. Navy 1978; Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

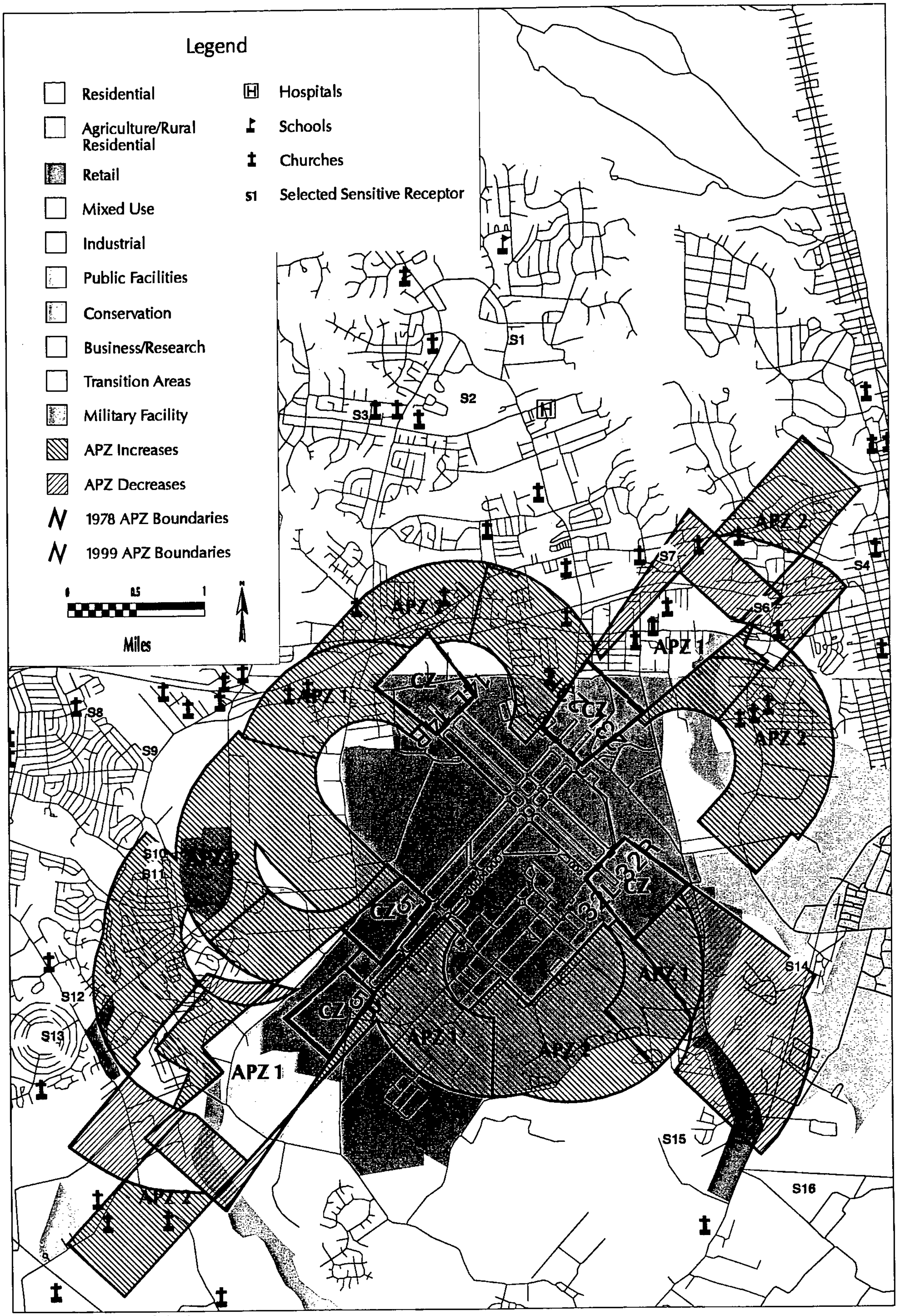
Figure 5.2-2

ARS 2 - Increase between 1978 AICUZ Noise Contours and Projected 1999 Noise Contours and Land Use
NAS Oceana



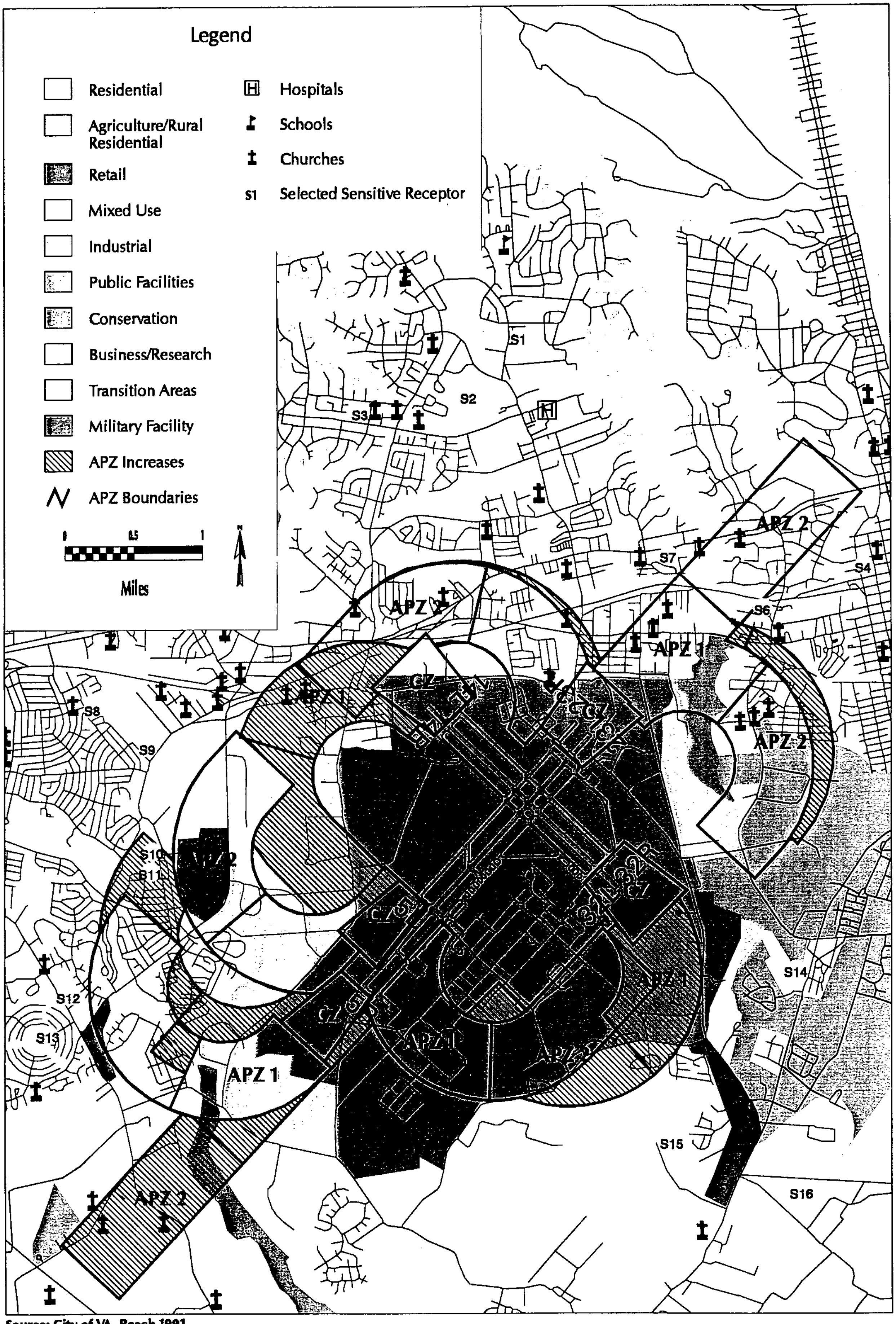
Source: Wyle Labs 1997

Figure 5.2-3
ARS 2 - Projected 1999 APZs
NAS Oceana



Source: City of VA. Beach 1991
City of Chesapeake 1993
US Navy 1978; Wyle Labs 1997

Figure 5.2-4
ARS 2 - Increase/Decrease Between 1978 and Projected 1999 APZs and Land Use
NAS Oceana



Source: City of VA. Beach 1991
City of Chesapeake 1993
Wyle Labs 1997

Figure 5.2-5
ARS 2 - Increase Between Existing 1997 and Projected 1999 APZs and Land Use
NAS Oceana

Table 5.2-9

PROJECTED EMISSIONS - DARE COUNTY RANGE ARS 2

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	221	0.0152	0.3623	0.0434	0.0097	0.0835
F/A-18	113	0.0301	0.1457	0.0747	0.0032	0.0361
AV-8	44	0.0033	0.0246	0.0238	0.0012	0.0000
EA-6B	4	0.0010	0.0012	0.0019	0.0001	0.0000
A-10	20	0.0012	0.0032	0.0099	0.0003	0.0014
F-16	50	0.0005	0.0587	0.0060	0.0008	0.0011
F-15	8	0.0001	0.0099	0.0010	0.0001	0.0002
T-34	2	0.0000	0.0000	0.0001	0.0000	0.0000
Total	**462**	**0.0515**	**0.6056**	**0.1607**	**0.0154**	**0.1223**
Net Change	**59**	**0.0254**	**0.0813**	**0.0530**	**0.0012**	**0.0262**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.

Table 5.2-10

LAND USE WITHIN EXISTING (1978 & 1997) AND PROJECTS (1999) APZs AT NAS OCEANA ARS 2

	1978 Acres/Hectares	1997 Acres/Hectares	Projected Acres/Hectares	Area Change 1978/1999 (Acres/Hectares)	Area Change 1997/1999 (Acres/Hectares)
Clear Zone					
Military Facility	578/234	684/277	625/253	54/22	-59/-24
Industrial	0/0	1/<1	1/<1	1/<1	0/0
Business/Research	0/0	0/0	0/0	0/0	0/0
Conservation	0/0	0/0	0/0	0/0	0/0
Residential	13/5	19/8	19/8	6/3	0/0
Public Facilities	0/0	0/0	0/0	0/0	0/0
Retail	0/0	0/0	0/0	0/0	0/0
Mixed Use	42/17	82/33	82/33	40/16	0/0
APZ 1					
Military Facility	268/108	630/255	644/261	376/153	14/6
Industrial	289/117	438/177	540/219	251/102	251/102
Business/Research	79/32	4/2	49/20	-30/-12	45/18
Conservation	87/35	118/48	124/50	37/15	6/2
Residential	418/169	459/186	759/307	341/138	300/121
Public Facilities	30/12	38/15	38/15	8/3	0/0
Retail	0/0	0/0	0/0	0/0	0/0
Mixed Use	135/55	233/94	434/176	299/121	201/82
APZ 2					
Military Facility	430/174	474/192	825/334	395/160	351/142
Industrial	142/57	150/61	435/176	293/119	285/115
Business/Research	89/36	243/98	441/178	352/62	198/80
Conservation	25/10	4/2	53/21	28/11	49/19
Residential	673/272	940/380	1,509/611	836/339	569/231
Public Facilities	175/71	269/109	333/135	158/64	64/26
Retail	84/34	0/0	155/63	71/29	155/63
Mixed Use	285/115	648/262	621/251	336/136	-27/-11
TOTAL	**3,842/1,555**	**5,589/2,262**	**7,757/3,139**	**3,915/1,584**	**2,168/877**

5.2.5 Socioeconomics and Community Services

5.2.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

The relocation of nine F/A-18 aircraft squadrons and the F/A-18 FRS to NAS Oceana under ARS 2 would result in the transfer of approximately 3,700 personnel (520 officers, 3,080 enlisted personnel, and 100 civilians) to NAS Oceana by the end of FY 1999.

However, as described under ARS 1, other personnel movements would also be occurring at NAS Oceana during the same time period. These other personnel movements include the decommissioning of the A-6 aircraft squadrons that were stationed at NAS Oceana and the realignment of several F-14 squadrons to NAS Oceana. Table 5.2-11 details the expected changes in NAS Oceana personnel loading figures through FY 1999. ARS 2 and these other planned personnel movements would result in a net increase of approximately 5,100 military and civilian personnel at NAS Oceana over the 1996 base loading level of 8,100 personnel.

Demographic impacts to the City of Virginia Beach and south Hampton Roads would be very similar to the impacts described for ARS 1. Using the assumptions described in the previous scenario, total regional population is expected to increase by approximately 11,400 residents when considering associated dependents; the City of Virginia Beach would gain more than 8,400 new residents (or a 2.1% increase over current population), while south Hampton Roads would gain nearly 10,600 new residents (or a 1.3% increase over current population) (see Table 5.2-12).

Economy, Employment, and Income

As in ARS 1, ARS 2 would have a positive, long-term impact on the economy of Virginia Beach and south Hampton Roads. This alternative would have very similar positive effects as those described in the previous scenario. The sole difference between these two scenarios is the amount of money that would be injected each year into the south Hampton Roads economy via military and civilian payroll expenditures. Total construction expenditures are expected to remain the same under both alternatives as the additional facilities are required regardless of the exact number of squadrons relocating.

Table 5.2-11

PROJECTED PERSONNEL LOADINGS AT NAS OCEANA UNDER ARS 2

	FY 1996	FY 1997	FY 1998	FY 1999
Personnel at beginning of FY	8,100	8,800	9,500	12,570
A-6 Decommissioning	-300	-300	NA	NA
A-6 AIMD and ATKWING Support Staff	NA	-100	NA	NA
Realignment of F-14 FRS Detachment[a]	NA	+150	NA	NA
Realignment of F-14 Squadrons[b]	+600	+600	NA	NA
F-14 Support Staff[b]	+400	+50	NA	NA
Transfer of F-14A Aircraft[c]	NA	+300	NA	NA
Realignment of F/A-18 Squadrons[b]	NA	NA	+1,740	+630
F/A-18 Support Staff	NA	NA	+1,330	NA
End of Fiscal Year	8,800	9,500	12,570	13,200
Net Change from Beginning of FY 1996	+700	+1,400	+4,470	+5,100

[a] Result of 1993 BRAC recommendations.
[b] Result of 1995 BRAC recommendations.
[c] Result of action separate from BRAC.

Key:

AIMD = Aircraft Intermediate Maintenance Department.
ATKWING = Attack Wing.
FRS = Fleet Replacement Squadron.
FY = Fiscal Year.
NA = Not applicable.

Source: U.S. Navy 1995a.

Table 5.2-12

NET REGIONAL SOCIOECONOMIC IMPACTS AT NAS OCEANA RESULTING FROM ARS 2[a]

	Virginia Beach	Chesapeake	Norfolk	Portsmouth	Suffolk	Total South Hampton Roads	Other	Total Effects
Population Impacts								
Total military personnel relocating	3,780	470	310	130	50	4,740	360	5,100
Number of military dependents	4,660	590	370	160	60	5,840	450	6,290
Total Population Change	**8,440**	**1,060**	**680**	**290**	**110**	**10,580**	**810**	**11,390**
Personnel and Regional Housing Impacts								
Total officers relocating	480	60	40	20	10	610	40	650
Total enlisted personnel relocating	3,230	400	260	110	40	4,040	310	4,350
Total civilians relocating	70	10	10	0	0	90	10	100
Total Military Households Relocating	**3,780**	**470**	**310**	**130**	**50**	**4,740**	**360**	**5,100**
Fiscal Impacts								
Total population change	8,440	1,060	680	290	110	10,580	810	NA
Local per capita tax contribution	$1,005	$1,128	$1,048	$883	$842	NA	NA	NA
Estimated Change in Local Tax Contributions	**$8,482,200**	**$1,195,680**	**$712,640**	**$256,070**	**$92,620**	**$10,739,210**	**NA**	**NA**
Education Impacts								
Total elementary school-age children	1,220	150	100	40	20	1,530	120	1,650
Total middle school-age children	370	50	30	10	0	450	40	500
Total high school-age children	240	30	20	10	0	290	20	320
Total Number on School-age Children	**1,830**	**230**	**150**	**60**	**20**	**2,260**	**180**	**2,470**

Note: Totals may not add up due to rounding.

[a] Includes relocations for ARS 2 and other relocations occurring at NAS Oceana.

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Table 5.2-13 presents the economic impacts that would occur at NAS Oceana as a result of ARS 2. As shown on the table, approximately $205 million would be injected into the regional economy via military and civilian payroll expenditures and almost $94 million via construction contracts.

Table 5.2-13

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF NINE F/A-18 AIRCRAFT SQUADRONS AND THE F/A-18 FLEET REPLACEMENT SQUADRON TO NAS OCEANA UNDER ARS 2

Impact	
Direct Economic Impacts	
Increase in Military and Civilian Payroll	$204,600,000
Construction Expenditures	$93,500,000
Total	$298,100,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$28,200,000
Employment Impacts (jobs)	1,190

[a] Indirect economic impacts have only been calculated for construction expenditures.

Housing

The proposed realignment of F/A-18 aircraft to NAS Oceana would have a significant impact on the demand for all types (bachelor and family) of military housing. Current Navy policy is to house E1-E4 personnel on-station and provide limited on-station housing for E-5 and above personnel. Therefore, the majority of E-5 and above personnel would reside in the local community. As of May 1997, NAS Oceana can accommodate approximately 1,800 personnel in existing BEQs. The proposed realignment would require approximately 3,360 personnel to be accommodated in BEQs. Therefore, the combination of existing adequate BEQ spaces and the planned BEQ to house 460 personnel (E1-E4) would not be sufficient to accommodate all the additional personnel. A shortfall of approximately 1,100 BEQ spaces would be expected.

As described for ARS 1, due to the relatively small number of officers relocating and the fact that most single officers prefer to live off-station, the existing BOQ facilities should be adequate to handle any increase in demand for on-station officer housing.

The proposed realignment would also have an impact on the demand for Navy family housing units in the south Hampton Roads area and would result in approximately 2,700 additional military families moving to the region from NAS Cecil Field (assuming a housing requirement factor of 60% and a voluntary separation factor of 10.5%). As described in ARS 1, approximately 49,000 military personnel in South Hampton Roads were eligible for Navy family housing in 1996. Existing military-controlled housing and adequate private-sector family housing was generally sufficient to handle this demand. By the year 2001, the number of Navy families eligible for housing will decrease to approximately 45,700 families as a result of downsizing activities and the relocation of 2,700 families to NAS Oceana from NAS Cecil Field. At the same time, approximately 560 additional Navy family housing units are expected to be built in the area. Therefore, there should be sufficient family housing to handle the increase in demand from the relocated personnel.

ARS 2 would have even less of an impact on the regional housing market than would ARS 1. The relocation of approximately 3,800 bachelor and family households to the City of Virginia Beach and 500 bachelor and family households to the City of Chesapeake would increase the demand for housing units in these areas. However, given the large number of housing units available in these cities, 147,037 units and 55,742 units respectively, the relocation will have little impact on the price or supply of housing in these cities.

Taxes and Revenues

The implementation of ARS 2 would have a positive fiscal impact on the City of Virginia Beach. Under ARS 2, the 8,400 new residents in the city would generate approximately $8.4 million in additional taxes revenues for the city. Table 5.2-12 presents the estimated change in local tax contributions for each community in the south Hampton Roads area.

Local government expenditures would also increase as a result of the influx of new residents to the communities. Expenditures on education, in particular, would increase. However, as for ARS 1, much of this negative fiscal impact would be offset by the potential increase in federal impact aid, local property tax receipts, and economic activity. No significant adverse fiscal impacts to these communities would occur as a result of implementation of ARS 2.

5.2.5.2 Community Services

The impacts of ARS 2 on community services would be similar to those described in ARS 1; however, they would be of a lesser magnitude. No significant impacts to community services at or around NAS Oceana would occur as a result of ARS 2.

5.2.6 Infrastructure

5.2.6.1 Water Supply

ARS 2 would result in impacts similar to or lesser than those discussed in Section 4.6.1. Specifically, ARS 2 would result in a net increase of approximately 5,100 personnel at NAS Oceana by the end of 1999. Using the same assumptions as for ARS 1 this would result in a net daily increase in water consumption at NAS Oceana of 0.217 MGD.

Regionally, the net increase of 5,100 personnel at NAS Oceana under ARS 2 would result in a total increase of approximately 10,580 persons (with dependents) to the south Hampton Roads region. Based on assumptions used for ARS 1, this would result in a daily increase of 0.759 MGD in water consumption in the City of Virginia Beach. In the City of Chesapeake, water consumption would increase by 0.073 MGD.

5.2.6.2 Wastewater System

The impacts of ARS 2 on wastewater systems would be slightly less than those described for ARS 1 (see Section 4.6.2). No significant adverse impacts to wastewater systems would occur under ARS 2.

5.2.6.3 Stormwater

The impacts of ARS 2 on stormwater systems at NAS Oceana would be similar to those described for ARS 1 (see Section 4.6.3).

5.2.6.4 Electrical

The impacts of ARS 2 on electrical systems at NAS Oceana would be similar to those described for ARS 1 (see Section 4.6.4).

5.2.6.5 Heating

The impacts of ARS 2 on heating systems at NAS Oceana would be similar to those described for ARS 1 (see Section 4.6.5).

5.2.6.6 Jet Fuel

The impacts of ARS 2 on jet fuel facilities at NAS Oceana would be similar to those described for ARS 1 (see Section 4.6.6).

5.2.6.7 Solid Waste Management

The impacts of ARS 2 on solid waste generation at NAS Oceana would be slightly less than those described for ARS 1 (see Section 4.6.7). No significant adverse impacts to regional landfill facilities would occur under ARS 2.

5.2.7 Transportation

The impacts of ARS 2 on roadways in the vicinity of NAS Oceana would be slightly less than those of ARS 1. Table 5.2-14 and Figure 5.2-6 compare projected traffic on roadways in the vicinity of the station under ARS 2 to currently projected traffic without the proposed realignment.

5.2.7.1 Regional Road Network

As under ARS 1, roads in the vicinity of the station would experience an increase in daily traffic. Virginia Beach Boulevard between First Colonial and Oceana Boulevard would drop from LOS C to D. A section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F, which would be considered a significant impact. Some roadways in the study area would continue to operate at an unacceptable LOS; however, these are the result of overall projected existing traffic and growth in the region. Although ARS 2 would result in additional traffic on these thoroughfares, actual impact on transportation would be, in most cases, negligible because the influx of traffic would be small relative to the existing traffic flows. Approved and planned roadway improvements on currently congested roadways (see Table 3.1-21) and personnel reductions associated with the decommissioning of A-6 squadrons would reduce the impact. Furthermore, planned roadway improvements, specifically the expansion of Oceana Boulevard, would provide additional capacity on the regional transportation network.

5.2.8 Noise

Noise impacts at NAS Oceana would be slightly less under ARS 2 than under ARS 1. Figure 5.2-7 presents projected 1999 AAD noise contours compared to existing 1978 AICUZ noise contours. Table 5.2-15 compares the estimated area and population within the 1978

Table 5.2-14

PROJECTED TRAFFIC CONDITIONS UNDER ARS 2
FOLLOWING REALIGNMENT OF AIRCRAFT
NAS OCEANA
(Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Princess Anne Road (on base)	21,379	C	24,889	D	3,510
Princess Anne Road (on base)- NASO Main Gate to Oceana Blvd.	13,745	C	17,255	C	3,510
London Bridge Road (on base)	9,591	C	12,241	C	2,650
Harpers Road - Dam Neck to London Bridge	2,295	C	2,457	C	162
Oceana Boulevard - Virginia Beach Blvd. to Bells	23,070	D	23,989	D	919
Oceana Boulevard - Bells to Princess Anne (NASO)	29,017	E	30,271	F	1,254
Oceana Boulevard - Princess Anne (NASO) to Harpers	30,227	F	30,338	F	111
Oceana Boulevard - Harpers to Flicker Way	27,862	F	27,949	F	87
Oceana Boulevard - Flicker Way to General Booth	42,876	F	42,944	F	68
First Colonial Road - Base Boundary to Indiana Avenue	1,737	C	1,742	C	5
First Colonial - Indiana to Virginia Beach Blvd.	14,788	C	15,205	C	417
First Colonial - Virginia Beach Boulevard to Expressway	25,808	D	26,052	D	244
London Bridge Road - Swamp Rd. to Shipps Corner	15,184	F	15,447	F	263
London Bridge Road - Shipps Corner to Crusader Circle	27,284	F	27,307	F	23
London Bridge Road - Crusader Circle to International Parkway	23,949	F	23,960	F	11
Virginia Beach Blvd. - Lynnhaven to Great Neck Road	23,560	B	23,980	B	420

Table 5.2-14

PROJECTED TRAFFIC CONDITIONS UNDER ARS 2 FOLLOWING REALIGNMENT OF AIRCRAFT NAS OCEANA (Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Virginia Beach Blvd. - London Bridge Rd. to Chapel Lake	22,961	B	23,381	B	420
Virginia Beach Blvd. - Chapel Lake to Fountain Dr.	3,826	B	4,390	B	564
Virginia Beach Blvd. - Fountain Dr. to First Colonial	4,307	B	5,589	C	1,282
Virginia Beach Blvd. - First Colonial to Oceana	13,306	C	14,919	D	1,613
Virginia Beach Blvd. - Oceana to Shipps Ln.	3,828	B	5,078	B	1,250
Virginia Beach Blvd. - Shipps Ln. to Birdneck	22,970	B	23,683	B	713
Virginia Beach/Norfolk Expressway (SR 44) - Lynnhaven to Great Neck	66,882	C	67,347	C	465
Virginia Beach/Norfolk Expressway (SR44) - Great Neck to First Colonial	40,383	B	40,848	B	465
VA Beach/Norfolk Expressway (SR44) - First Colonial to Birdneck	44,253	B	44,601	B	348
Laskin Road - Great Neck to Victor Cr.	45,927	F	46,013	F	86
Laskin Road - Victor Cr. to First Colonial	48,234	F	48,674	F	440
Laskin Road - First Colonial to Birdneck Rd.	22,649	B	22,987	B	338
Bells Road - Birdneck to Oceana Blvd.	7,963	C	8,409	C	446
Birdneck Road - General Booth to Bells	8,274	C	8,482	C	208
Birdneck Road - Bells to Owl's Creek	12,205	D	12,413	D	208

Table 5.2-14 (Cont.)

Note: LOS based on Generalized Annual Average Daily Volumes for area's transitioning into urbanized areas as established in Level of Service Standards and Guidelines Manual for Planning (Florida Department of Transportation 1992).

Key:

A = Free flow conditions.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds, however low maneuverability.
E = Traffic at capacity of segment. Unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
NASO = Naval Air Station Oceana.

Source: HRPDC 1995c.

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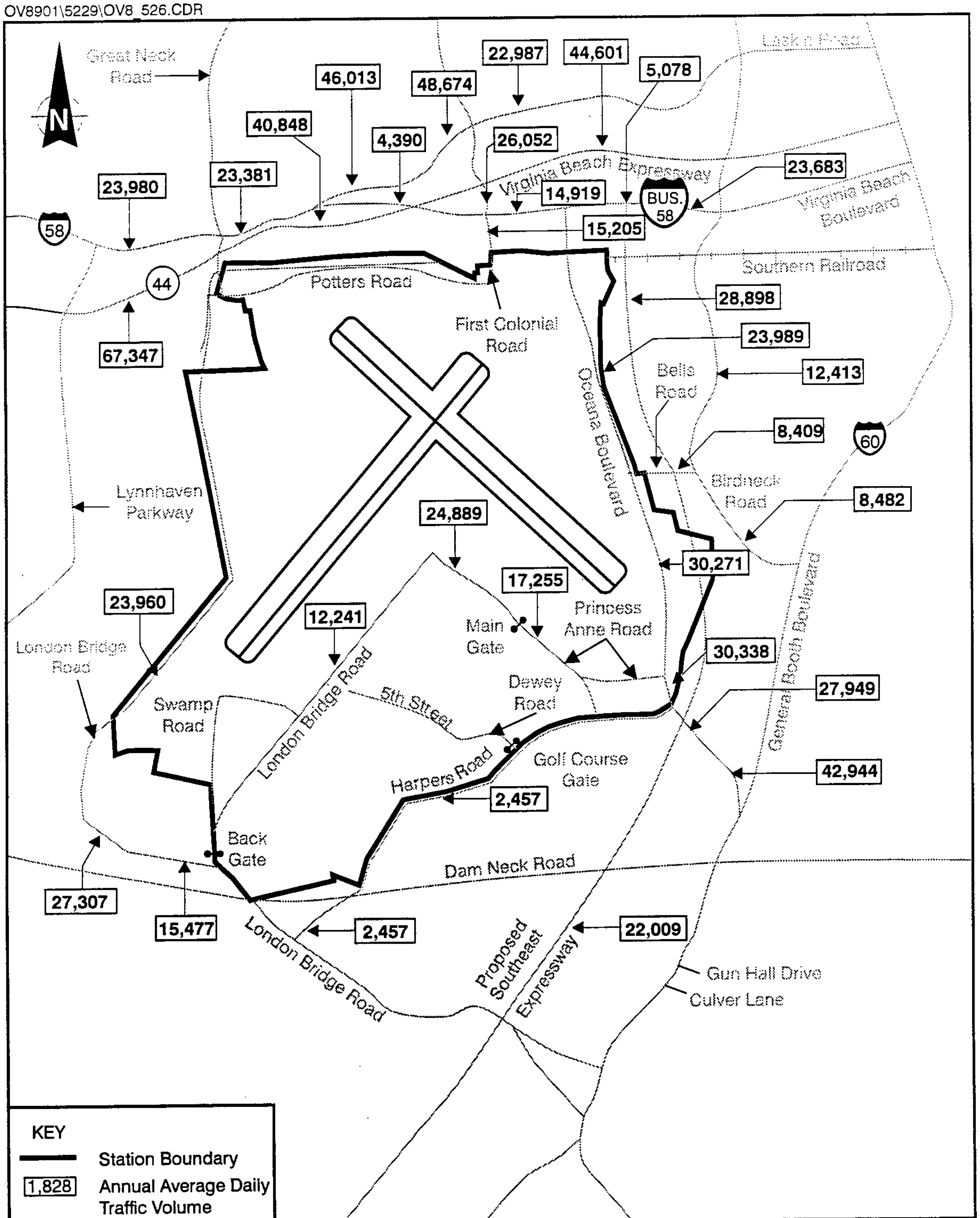


SOURCE: Hampton Roads Planning District Commission 1995c

SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 5.2-6 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING NAS OCEANA FOLLOWING REALIGNMENT UNDER ARS 2

Table 5.2-15

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1978 AICUZ, EXISTING 1997, AND PROJECTED 1999 NOISE CONTOURS NAS OCEANA/NALF FENTRESS - ARS 2

Ldn	1978 AICUZ		1997 Noise Contours		1999 Noise Contours		New Area/Population Exposed Relative to 1978 AICUZ[a]	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	31,214 (12,632)	66,123	13,293 (5,379)	33,545	33,094 (13,393)	77,241	11,596 (4,693)	19,320
75 dB or greater	20,361 (8,240)	42,445	4,949 (2,002)	1,295	26,695 (10,803)	48,406	7,375 (2,985)	14,416
Total	51,575 (20,872)	108,568	18,242 (7,382)	34,840	59,789 (24,196)	125,647	18,971 (7,678)	33,736

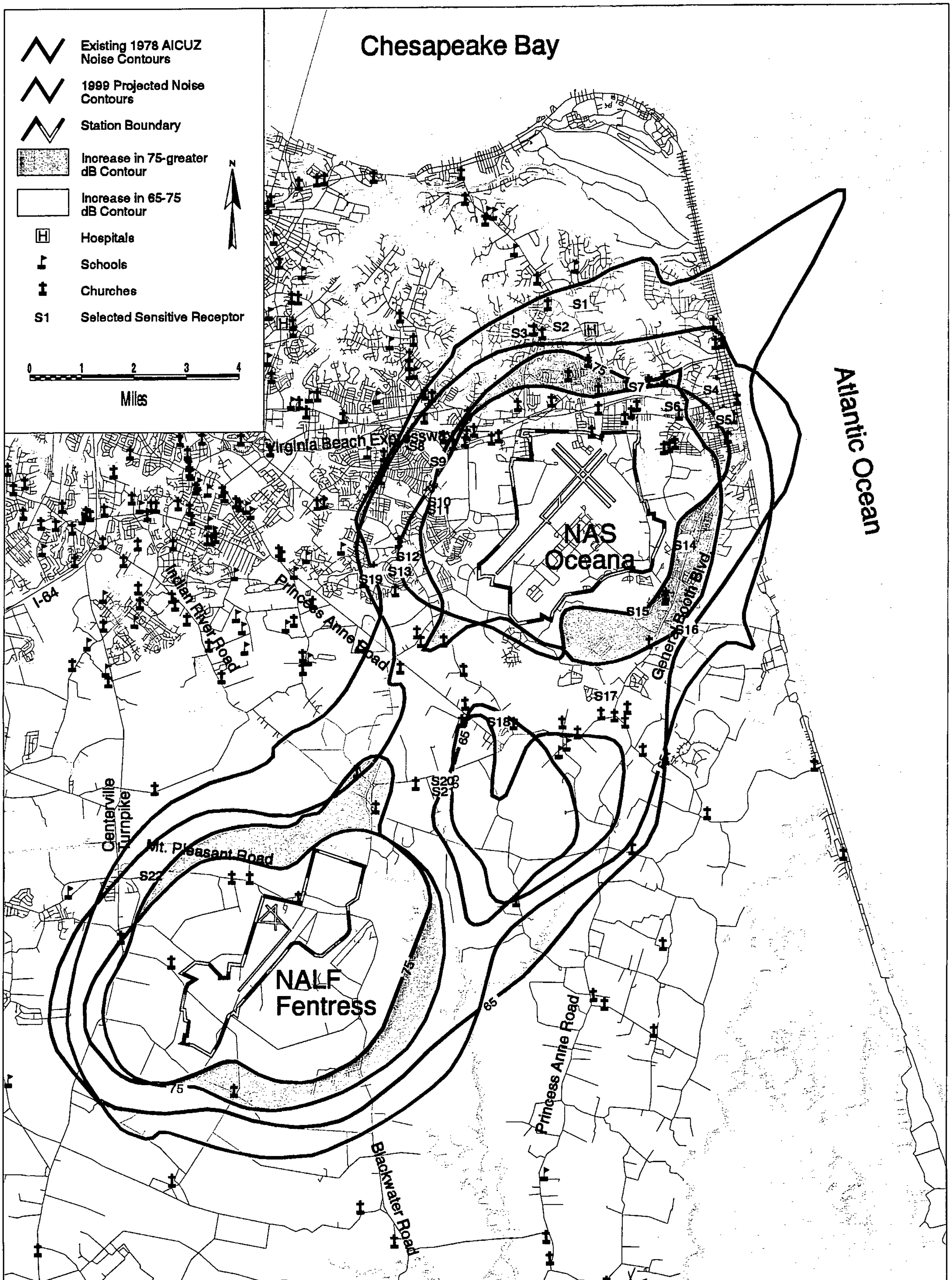
Note: Numbers exclude water areas.

a Represents only new area/population that previously were not exposed to listed noise levels under 1978 AICUZ. Does not equal the difference between 1978 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.



Source: U.S. Navy 1978, Wyle Labs 1997

Figure 5.2-7

ARS 2 - Comparison of 1978 and Projected 1999 Average Annual Day Noise Contours

NAS Oceana

AICUZ contours and existing 1997 noise contours to projected 1999 noise contours under ARS 2. The projected 65 to 75 dB noise contour for ARS 2 would cover an area of 33,094 acres (13,393 hectares) with an estimated population of 77,241 people. The 75 dB or greater contour would cover an area of 26,695 acres (10,803 hectares) with an estimated population of 48,406 people, of which 14,416 people are located in areas previously exposed to noise levels less than 75 dB in the 1978 AICUZ (Wyle Labs 1997). As in ARS 1, selected areas in the vicinity of NAS Oceana would experience a decrease in noise levels due to existing aircraft flight tracks and runway utilization (see Table 5.2-16). The estimated population that would realize reduced noise levels is approximately 12,575 people, including an estimated 9,658 people who would experience a decrease in high noise levels (greater than 75 Ldn).

Table 5.2-17 presents the projected site-specific Ldn at schools located within the 65 Ldn or greater Ldn contour. The projected impacts at these locations vary, ranging from a 5 to 21 dB increase over existing conditions (Wyle Labs 1997). Schools are considered compatible with outside noise levels between 65 and 75 Ldn only if they have sufficient sound attenuation to reduce interior noise levels to approximately 45 dB. To analyze potential noise impacts to schools, the school-day (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) Leq was calculated for 1999 conditions for those schools expected to be within the 65 dB or greater Ldn (see Table 5.2-17). Use of central air conditioning systems in association with closed windows normally reduces noise levels by approximately 25 dB. Therefore, school sites with a 1999 exterior Leq of 70 dB or less would likely experience minimal interference. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at those schools of particular concern.

A detailed discussion of environmental noise impacts is presented in Section 4.8. The maximum levels of typical F/A-18 events similar to those conducted at NAS Oceana and NALF Fentress are shown in Table 5.2-17. Sound levels for F-14s are shown for comparative purposes. The anticipated number of daily operations by event is presented in Table 5.2-18.

The noise contours presented in Figure 5.2-6 are based on current operating procedures and flight patterns at NAS Oceana. The station continually evaluates noise mitigation options to reduce the noise impacts on the local community. These include an evaluation of:

- Arrival and departure procedures;
- Airfield hours of operation;

Table 5.2-16

DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE RELATIVE TO 1978 AICUZ NAS OCEANA/NALF FENTRESS ARS 2

Reduction in Ldn	Area in Acres (Hectares)	Estimated Population
75+ to 65-75 Ldn	-1,691 (-684)	-9,658
65-75 to <65 Ldn	-3,781 (-1,530)	-2,917
Total	-5,472 (-2,215)	-12,575

Note: Numbers exclude water areas.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.

Table 5.2-17

SCHOOLS LOCATED WITHIN 1999 PROJECTED CONTOURS GREATER THAN 65 LDN NAS OCEANA/NALF FENTRESS

Identification Number[a]/Name	1997 Ldn (dB)	1999 Ldn (dB)	1999 Leq (dB)
S1 First Colonial High	59	68	67
S2 Lynnhaven Middle	61	71	70
S3 Trantwood Elementary	56	69	67
S4 Virginia Beach Middle	57	70	69
S5 Cooke Elementary	57	70	67
S6 Seatack Elementary[b]	63	77	74
S7 Linkhorn Elementary[b]	62	75	74
S8 Lynnhaven Elementary	55	69	65
S9 Plaza Middle	60	74	70
S10 Brookwood Elementary	66	78	74
S11 Plaza Elementary	67	79	75
S12 Holland Elementary	66	71	69
S13 Green Run Elementary	62	69	67
S14 Birdneck Elementary	67	83	75
S15 Corporate Landing Elementary & Middle	63	78	72
S16 Ocean Lake Elementary	57	73	66
S17 Strawbridge Elementary	58	69	66
S18 Kellam High	56	66	62
S19 Rosemont Elementary	59	65	63
S20 Princess Anne Elementary	52	66	62
S21 Princess Anne Middle	52	66	62
S22 Butts Road Intermediate	52	73	64

[a] Schools are shown on Figure 5.2-7.
[b] Seatack and Linkhorn elementary schools are being relocated.

Key:

Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

Table 5.2-18

MAXIMUM SOUND LEVELS AT RECEPTOR WITH AIRCRAFT AT 1,000 FEET AGL (decibels)

	F/A-18	F-14A	F14B/D
Departures	108	97	96
Arrivals	104	83	88
Touch-and-go	97	87	91
FCLP			
Oceana	97	87	91
Fentress[a]	98	90	93

[a]800 feet AGL.

Table 5.2-19

PROJECTED AVERAGE DAY OPERATIONS FOR SELECTED F/A-18 SORTIES

	NAS Oceana	NALF Fentress
Departures	59	9
Arrivals	59	9
Touch-and-go[a]	89	0
FCLP[a]	2	55

[a] Touch-and-go and FCLP sorties equal two operations each.

- Pattern altitudes;
- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

NAS Oceana would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation. These options are discussed in Section 4.8.

5.2.9 Air Quality

5.2.9.1 Air Quality Regulations

The air quality regulations discussion presented in 4.9.1 is also applicable to ARS 2.

5.2.9.2 General Conformity Rule

The General Conformity Rule discussion presented in Section 4.9.2 is also applicable to ARS 2.

5.2.9.3 Projected Emissions at NAS Oceana

Projected emissions for ARS 2 are presented in Table 5.2-20. The categories of sources in ARS 2 are identical to those in ARS 1. A smaller number of F/A-18 aircraft based at NAS Oceana in 1999 is the only change affecting emissions. The reduced number of aircraft lower the total emissions projected for NAS Oceana in the categories of aircraft operations, in-frame maintenance run-ups, and stationary source engine test cell operations. Other sources listed in Table 5.2-20 would not be altered by the smaller number of F/A-18 aircraft in ARS 2 compared to ARS 1. For example, stationary source emissions would not be reduced by an appreciable amount because the large majority of assets would still be located at NAS Oceana. Boilers used to generate steam and hot water would still be operated but with only slightly reduced utility demand on them. None of the existing boilers are expected to be shut down.

The estimated nonattainment precursor emissions in 1999 for aircraft operations at NAS Oceana would be 350 tons per year of VOC and 483 tons per year of NO_x. Attainment pollutant emissions would be 933 tons per year of CO, 21 tons per year of SO_2, and 260 tons per year of PM_{10}. Total nonattainment precursor emissions for other mobile sources would be 59 tons per year of VOCs and 239 tons per year of NO_x. Attainment pollutant emissions would be 153 tons per year of CO, 7 tons per year of SO_2, and 86 tons per year of PM_{10}.

The estimated nonattainment ozone precursor emissions in 1999 for stationary sources, including engine test cell operations, are 55 tons per year of VOCs and 108 tons per year of NO_x. Attainment pollutant emissions are 82 tons per year of CO, 29 tons per year of SO_2, and 16 tons per year of PM_{10}.

5.2.9.4 Projected Emissions at NALF Fentress

This facility is used in the same manner under ARS 2 as in ARS 1, although fewer F/A-18 operations occur under ARS 2. The projected emissions for aircraft operations are

Table 5.2-20
AIR EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 2
FOR 1993 AND 1996-1999
(tons per year)

	1993					1996					1997				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:															
Mobile Sources:															
Aircraft Operations	272.13	328.88	609.85	18.59	152.58	122.12	224.40	291.76	10.76	121.23	149.27	289.09	357.14	13.82	156.13
Total Aircraft	**272.13**	**328.88**	**609.85**	**18.59**	**152.58**	**122.12**	**224.40**	**291.76**	**10.76**	**121.23**	**149.27**	**289.09**	**357.14**	**13.82**	**156.13**
Other Mobile Sources:															
GSE	5.13	26.43	72.65	1.71	2.00	0.00	0.00	0.00	0.00	0.00	4.57	34.01	18.73	2.20	2.66
Maintenance Run-ups	70.29	177.95	130.69	5.82	47.42	29.40	136.41	61.78	3.90	47.42	38.29	198.30	97.19	5.86	72.28
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	**75.97**	**211.27**	**204.82**	**7.98**	**49.90**	**29.96**	**143.30**	**63.26**	**4.35**	**47.90**	**43.42**	**239.20**	**117.40**	**8.51**	**75.42**
Stationary Sources:															
Boilers:	1.13	32.32	8.31	22.09	3.84	0.78	29.13	7.52	23.76	3.63	0.78	29.13	7.52	23.76	3.63
Generators	0.71	8.67	1.87	0.57	0.61	0.71	8.67	1.87	0.57	0.61	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	6.24	37.65	49.39	1.80	4.32	3.95	28.47	39.08	1.31	3.95	5.05	37.02	50.85	1.71	4.62
JP-5 Fuel Handling	0.66	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
Service Station	19.35	0.00	0.00	0.00	0.00	4.46	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00
Painting	19.30	0.00	0.00	0.00	0.00	13.29	0.00	0.00	0.00	0.00	24.05	0.00	0.00	0.00	0.00
Construction:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary	**47.39**	**78.64**	**59.57**	**24.46**	**8.77**	**23.65**	**66.27**	**48.47**	**25.64**	**8.19**	**37.20**	**94.02**	**65.64**	**29.24**	**10.46**
Total NASO	**395.49**	**618.78**	**874.24**	**51.04**	**211.24**	**175.73**	**433.96**	**403.48**	**40.75**	**177.32**	**229.89**	**622.31**	**540.17**	**51.57**	**242.01**
NALF Fentress:															
Aircraft	13.48	146.63	37.00	6.81	30.87	11.70	154.28	24.95	6.38	41.72	13.56	187.54	29.08	7.51	54.61
Total Annual:	**408.97**	**765.41**	**911.24**	**57.85**	**242.11**	**187.43**	**588.24**	**428.43**	**47.13**	**219.04**	**243.45**	**809.85**	**569.25**	**59.08**	**296.63**

Table 5.2-20
AIR EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 2
FOR 1993 AND 1996-1999
(tons per year)

	1998					1999				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:										
Mobile Sources:										
Aircraft Operations	302.20	437.16	797.77	19.58	234.95	349.60	483.02	933.28	21.41	259.56
Total Aircraft	**302.20**	**437.16**	**797.77**	**19.58**	**234.95**	**349.60**	**483.02**	**933.28**	**21.41**	**259.56**
Other Mobile Sources:										
GSE	0.10	1.21	0.26	0.08	0.08	0.00	0.00	0.00	0.00	0.00
Maintenance Run-ups	53.59	224.29	138.77	3.43	83.85	58.24	232.49	151.13	6.84	87.63
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	**54.25**	**232.39**	**140.51**	**3.96**	**84.42**	**58.80**	**239.38**	**152.61**	**7.29**	**88.11**
Stationary Sources:										
Boilers:	0.62	27.13	6.68	22.82	3.38	0.62	27.13	6.68	22.82	3.38
Generators	2.11	27.87	7.27	3.77	2.21	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	9.16	48.87	64.19	1.99	9.27	10.42	52.57	68.45	2.09	10.56
JP-5 Fuel Handling	0.81	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
Service Station	6.40	0.00	0.00	0.00	0.00	6.72	0.00	0.00	0.00	0.00
Painting	34.12	0.00	0.00	0.00	0.00	34.16	0.00	0.00	0.00	0.00
Construction:	2.55	26.13	8.18	2.41	4.04	0.00	0.00	0.00	0.00	0.00
Total Stationary	**55.77**	**130.01**	**86.32**	**30.99**	**18.90**	**54.93**	**107.57**	**82.40**	**28.68**	**16.15**
Total NASO	**412.22**	**799.56**	**1024.60**	**54.53**	**338.27**	**463.33**	**829.97**	**1168.29**	**57.38**	**363.81**
NALF Fentress:										
Aircraft	15.11	239.95	35.66	9.19	77.05	15.61	254.97	37.63	9.68	83.57
Total Annual:	**427.33**	**1,039.51**	**1,060.26**	**63.72**	**415.32**	**478.94**	**1,084.94**	**1,205.92**	**67.06**	**447.39**

Note: Shaded areas indicate nonattainment pollutants of concern.

Key: VOC = volatile organic compounds.
NOx = oxides of nitrogen.
CO = carbon monoxide.
SO2 = sulfur dioxide.
PM10 = particulate matter.
JP-5 = jet fuel.
GSE = Ground Support Equipment

summarized by year in Table 5.2-20. In 1999, nonattainment precursor emissions (VOC and NO_x) from these operations are 16 and 255 tons per year, respectively. Attainment pollutant emissions total 38 tons per year of CO, 10 tons per year of SO_2, and 84 tons per year of PM_{10}.

5.2.9.5 Total Net Projected Emissions

Table 5.2-21 presents the summary of net projected emissions from NAS Oceana and NALF Fentress for 1993 and 1996 through 1999 for ARS 2. The net change in emissions for ARS 2 would be 70 tons per year of VOCs and 320 tons per year of NO_x. ARS 2 reduces net air emissions by 35 tons per year VOCs and 63 tons per year NO_x compared to ARS 1. The net change for attainment pollutants are 295 tons per year of CO, 9 tons per year of SO_2, and 205 tons per year of PM_{10}.

5.2.10 Topography, Geology, and Soils

The impacts of ARS 2 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.10)

5.2.11 Water Resources

The impacts of ARS 2 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.11)

5.2.12 Terrestrial Environment

The impacts of ARS 2 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.12)

5.2.13 Cultural Resources

The impacts of ARS 2 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.13)

5.2.14 Environmental Contamination

The impacts of ARS 2 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.14) except for the amount of hazardous waste generated at the station. Hazardous waste would increase by 49,400 lbs. This represents a 35% increase over 1995. This increase can be accommodated within existing hazardous waste management systems.

Table 5.2-21
ARS 2
NET EMISSIONS CHANGE - NAS OCEANA AND NALF FENTRESS - ARS 2
(tons per year)

Year	VOCs	NOx	CO	SO2	PM10
NAS Oceana:					
1993	395.49	618.78	874.24	51.04	211.24
1996	175.73	433.96	403.48	40.75	177.32
1997	229.89	622.31	540.17	51.57	242.01
1998	412.22	799.56	1024.60	54.53	338.27
1999	463.33	829.97	1168.29	57.38	363.81
Net Change:					
1993 to 1999	**67.84**	**211.19**	**294.05**	**6.34**	**152.57**
NALF Fentress:					
1993	13.48	146.63	37.00	6.81	30.87
1996	11.70	154.28	24.95	6.38	41.72
1997	13.56	187.54	29.08	7.51	54.61
1998	15.11	239.95	35.66	9.19	77.05
1999	15.61	254.97	37.63	9.68	83.57
Net Change:					
1993 to 1999	**2.13**	**108.34**	**0.63**	**2.88**	**52.71**
Net Change NAS Oceana and NALF Fentress:					
1993 to 1999	**69.97**	**319.53**	**294.68**	**9.22**	**205.27**

Note: Shaded areas indicate nonattainment pollutants of concern.

Key:

VOC = volatile organic compounds
NOx = oxides of nitrogen
CO = carbon monoxide
SO2 = sulfur dioxide
PM10 = particulate matter

6 Environmental Consequences and Mitigation Measures: Alternative Realignment Scenario 3

ARS 3 would involve realigning three F/A-18 fleet squadrons to MCAS Cherry Point, with the remaining eight F/A-18 fleet squadrons and the F/A-18 FRS being realigned to NAS Oceana. Therefore, this section discusses potential impacts at MCAS Cherry Point and NAS Oceana. Where appropriate, mitigation measures to avoid or lessen the severity of projected impacts are discussed.

6.1 Environmental Consequences and Mitigation Measures: ARS 3 at MCAS Cherry Point

6.1.1 Airfield Operations

The projected operations under ARS 3 would not significantly affect airfield operations at MCAS Cherry Point. Projected airfield operations were calculated as part of the NASMOD analysis conducted at the station (ATAC 1997). A discussion of the components of NASMOD is presented in Section 4.1.

Table 6.1-1 presents projected basic aircraft operations at MCAS Cherry Point under ARS 3. Total operations at MCAS Cherry Point would increase from 1997 levels, growing from approximately 116,000 to 137,000 operations. This would represent an 18% increase over 1997 levels (ATAC 1997). At MCALF Bogue, total operations would remain relatively constant because it would not be used for Navy F/A-18 operations associated with ARS 3. Further, F/A-18 operations associated with ARS 3 would not significantly displace operations by other MCAS Cherry Point aircraft to MCALF Bogue.

Based upon the training requirements at MCAS Cherry Point, F/A-18 aircraft that would be realigned under ARS 3 could complete their required number of operations without significantly affecting overall airfield operations at the station. Unusually long taxi times, fuel pit delays, or denials to access certain patterns would not occur at the station as result of ARS 3 (ATAC 1997).

6.1.2 Military Training Areas

ARS 3 would result in F/A-18 aircraft based at MCAS Cherry Point and NAS Oceana using the same military training areas in eastern North Carolina. An overall discussion of projected operations is presented in Section 6.2.2.

6.1.3 Target Ranges

Under ARS 3, F/A-18 aircraft based at MCAS Cherry Point and NAS Oceana would use the same target ranges (BT-9, BT-11, and Dare County Range) in eastern North Carolina. An overall discussion of projected operations is provided in Section 6.2.3.

6.1.4 MCAS Cherry Point Land Use

6.1.4.1 Projected Land Use

To support the realignment of three F/A-18 aircraft squadrons to MCAS Cherry Point under ARS 3, Hangars 1700, 131S, 1665W would be renovated and a new F/A-18 AIMD

Table 6.1-1

1997 and Projected 1999 Basic Operations at MCAS Cherry Point for ARS 3

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations Day 0700-2200	Night 2200-0700	Total	% Change
AV-8 Fleet	Departure	10,123	9,801	158	9,959	
	Full Stop Visual Landing	8,369	7,923	304	8,227	
	Full Stop Instrument Landing	558	514	50	564	
	Pad Landing	1,209	1,082	98	1,180	
	Visual Touch-and-Go/Low Approach	4,612	3,846	374	4,220	
	Instrument Touch-and-Go/Low Approach	2,370	2,314	12	2,326	
	Press-Up	6,686	6,648	10	6,658	
	Pad Vertical Take-off to Pad Landing Circuit	2,986	2,674	218	2,892	
	TOTAL	36,913	34,802	1,224	36,026	
AV-8 FRS	Departure	11,570	11,139	140	11,279	
	Full Stop Visual Landing	8,365	7,969	138	8,107	
	Full Stop Instrument Landing	491	517	6	523	
	Pad Landing	2,714	2,597	52	2,649	
	Visual Touch-and-Go/Low Approach	778	764	4	768	
	Instrument Touch-and-Go/Low Approach	4,128	3,972	44	4,016	
	Press-Up	6,546	6,352	62	6,414	
	Pad Vertical Take-off to Pad Landing Circuit	2,640	2,438	94	2,523	
	TOTAL	37,232	35,748	540	36,288	
EA-6B	Departure	2,126	2,116	11	2,127	
	Full Stop Visual Landing	1,889	1,736	154	1,890	
	Full Stop Instrument Landing	238	222	16	238	
	Visual Touch-and-Go/Low Approach	5,502	5,114	348	5,462	
	Instrument Touch-and-Go/Low Approach	1,970	1,698	266	1,964	
	TOTAL	11,725	10,886	795	11,681	
F/A-18 Fleet	Departure	0	3,575	271	3,846	
	Full Stop Visual Landing	0	3,068	346	3,414	
	Full Stop Instrument Landing	0	348	80	428	
	Visual Touch-and-Go/Low Approach	0	4,018	140	4,158	
	Instrument Touch-and-Go/Low Approach	0	480	72	552	
	Field Carrier Landing Practice	0	8,368	2,298	10,666	
	TOTAL	0	19,857	3,207	23,064	
KC-130 Fleet	Departure	632	631	0	631	
	Full Stop Visual Landing	282	251	32	283	
	Full Stop Instrument Landing	350	328	20	348	
	Visual Touch-and-Go/Low Approach	1,484	1,354	138	1,492	
	Instrument Touch-and-Go/Low Approach	1,606	1,572	40	1,612	
	TOTAL	4,354	4,136	230	4,366	
KC-130 FRS	Departure	803	802	0	802	
	Full Stop Visual Landing	284	286	5	291	
	Full Stop Instrument Landing	519	471	40	511	
	Visual Touch-and-Go/Low Approach	3,942	3,834	90	3,924	
	Instrument Touch-and-Go/Low Approach	3,356	3,234	60	3,294	
	TOTAL	8,904	8,627	195	8,822	

Table 6.1-1

1997 and Projected 1999 Basic Operations at MCAS Cherry Point for ARS 3

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations Day 0700-2200	Night 2200-0700	Total	% Change
Transient Jet	Departure	1,798	1,756	40	1,796	
	Full Stop Visual Landing	1,328	1,326	0	1,326	
	Full Stop Instrument Landing	470	470	0	470	
	Visual Touch-and-Go/Low Approach	1,336	1,304	0	1,304	
	Instrument Touch-and-Go/Low Approach	1,052	1,030	2	1,032	
	TOTAL	5,984	5,886	42	5,928	
Transient Prop	Departure	658	658	0	658	
	Full Stop Visual Landing	219	219	0	219	
	Full Stop Instrument Landing	439	439	0	439	
	Visual Touch-and-Go/Low Approach	2,628	2,594	0	2,594	
	Instrument Touch-and-Go/Low Approach	362	354	2	356	
	TOTAL	4,306	4,264	2	4,266	
Transient Heavy	Departure	183	110	73	183	
	Full Stop Instrument Landing	183	181	2	183	
	Instrument Touch-and-Go/Low Approach	340	328	0	328	
	TOTAL	706	619	75	694	
Transient Large	Departure	694	539	155	694	
	Full Stop Visual Landing	146	146	0	146	
	Full Stop Instrument Landing	548	540	8	548	
	Instrument Touch-and-Go/Low Approach	944	914	6	920	
	TOTAL	2,332	2,139	169	2,308	
Transient Helicopter	Departure	1,765	1,348	417	1,765	
	Full Stop Visual Landing	1,765	1,732	33	1,765	
	Instrument Touch-and-Go/Low Approach	268	266	0	266	
	TOTAL	3,798	3,346	450	3,796	
	AIRFIELD TOTAL	116,254	130,310	6,929	137,239	18

facility would be constructed and outfitted. Overall, these proposed projects are designed to take advantage of existing facilities and a formerly disturbed site, thereby minimizing potential land disturbance. The operating characteristics of these projects are consistent with adjoining land uses and would not result in any significant conflicts.

The projects under ARS 3 are removed from surrounding lands off station. These projects would not result in conflicts with surrounding land uses.

6.1.4.2 Land Use Plans and Policies

Because projects under ARS 3 would be within disturbed areas, there would not be a significant impact to natural resources. Therefore, projects under ARS 3 would be consistent with the station's Natural Resource Management Plan.

- The hangar renovations for Buildings 1665W, 131S, and 1700 would be located at the eastern edge of the core area and to the west of the flight line. These projects would be consistent with the Master Plan proposed use of this area as "maintenance/production."

- The AIMD facility would be located at the east end of the core area on a cleared piece of land and would not be consistent with the Master Plan designation of this area as "administration." However, the 1988 Master Plan did not foresee the eventual removal of all BEQ facilities in this area. Because much of the former troop housing in the vicinity of the site has been removed and compatible land use activities occur adjacent to the site along the flight line, the proposed AIMD facility would not significantly affect surrounding land uses. The AIMD would impact 2.2 acres (0.9 hectare).

The existing hangars to be renovated are consistent with future land use classifications in the station's 1988 Master Plan. The AIMD facility, however, is inconsistent with the future land use classifications for the project location. The proposed site was classified in 1988 as "administration/training", while the AIMD would be classified as an "aircraft maintenance" land use. However, the 1988 Master Plan did not foresee the eventual removal of all BEQ facilities in this area. Because much of the former troop housing in the vicinity of the site has been removed and compatible land use activities occur adjacent to the site along the flight line, the proposed AIMD facility would not significantly affect surrounding land uses.

Although projects and operations under ARS 3 are not expected to generate impacts inconsistent with local regulations, or adversely impact any land or water use or natural resources of the coastal zone, the actions will have to be determined to be consistent with the enforceable policies of the North Carolina Coastal Management Program, and local land use

plans. A coastal zone consistency determination will be prepared by the Navy and included as part of the FEIS. Concurrence will be sought from the NCDEHNR on the consistency determination.

With regard to the AICUZ program at MCAS Cherry Point, noise impacts from the implementation of ARS 3 would result in the expansion of associated noise zones (see Section 6.1.8). Part of the increase is attributable to changes in runway utilization between the 1988 AICUZ and the projected contours. The 65 to 75 dB Ldn contour (i.e., Noise Zone 2) would grow by approximately 2,883 acres (1,167 hectares) from the corresponding area in the current AICUZ program. The 75 dB or greater Ldn contour (i.e., Noise Zone 3) would grow by approximately 237 acres (96 hectares) from the corresponding area in the current AICUZ program. Figure 6.1-1 presents the increase in land use coverage between existing AICUZ and projected 1999 noise contours at MCAS Cherry Point under ARS 3. As shown, larger areas would be exposed to aircraft noise.

With regard to APZs under the AICUZ Program, implementation of ARS 3 would result in an increase of 2,789 acres (1,127 hectares) over existing conditions (see Table 6.1-2). Figure 6.1-2 presents 1999 projected APZs, which include APZs under the existing AICUZ program as well as the APZs associated with operations of two additional F/A-18 squadrons. Figure 6.1-3 shows the increases between 1997 and 1999 APZs and land use.

As discussed in Section 3.1.4, the APZs do not indicate the probability of an accident but rather the probable accident location should an accident occur. Appendix G provides more information on the development of APZs. The Navy's recent update of aircraft accident data for the period from 1982 to 1997 indicates that the F/A-18 experiences fewer accidents than other fighter aircraft in the inventory. In fact, during this period only three F/A-18 Class "A" accidents (i.e., aircraft suffered more than $1 million in damage or a fatality occurred) were reported within a 5-mile radius of Navy and Marine Corps airfields in the U.S. and Japan.

Implementation of ARS 3 would result in increases in noise levels and APZs. This may affect availability of federally guaranteed mortgage loans. HUD, FHA, and VA mortgage policies generally prohibit guaranteeing mortgage loans for new homes located within noise contours of 75 dB Ldn or greater or within clear zones. These same mortgage policies make availability of federally guaranteed mortgage loans discretionary for new homes located within noise contours of 65 to 75 dB Ldn.

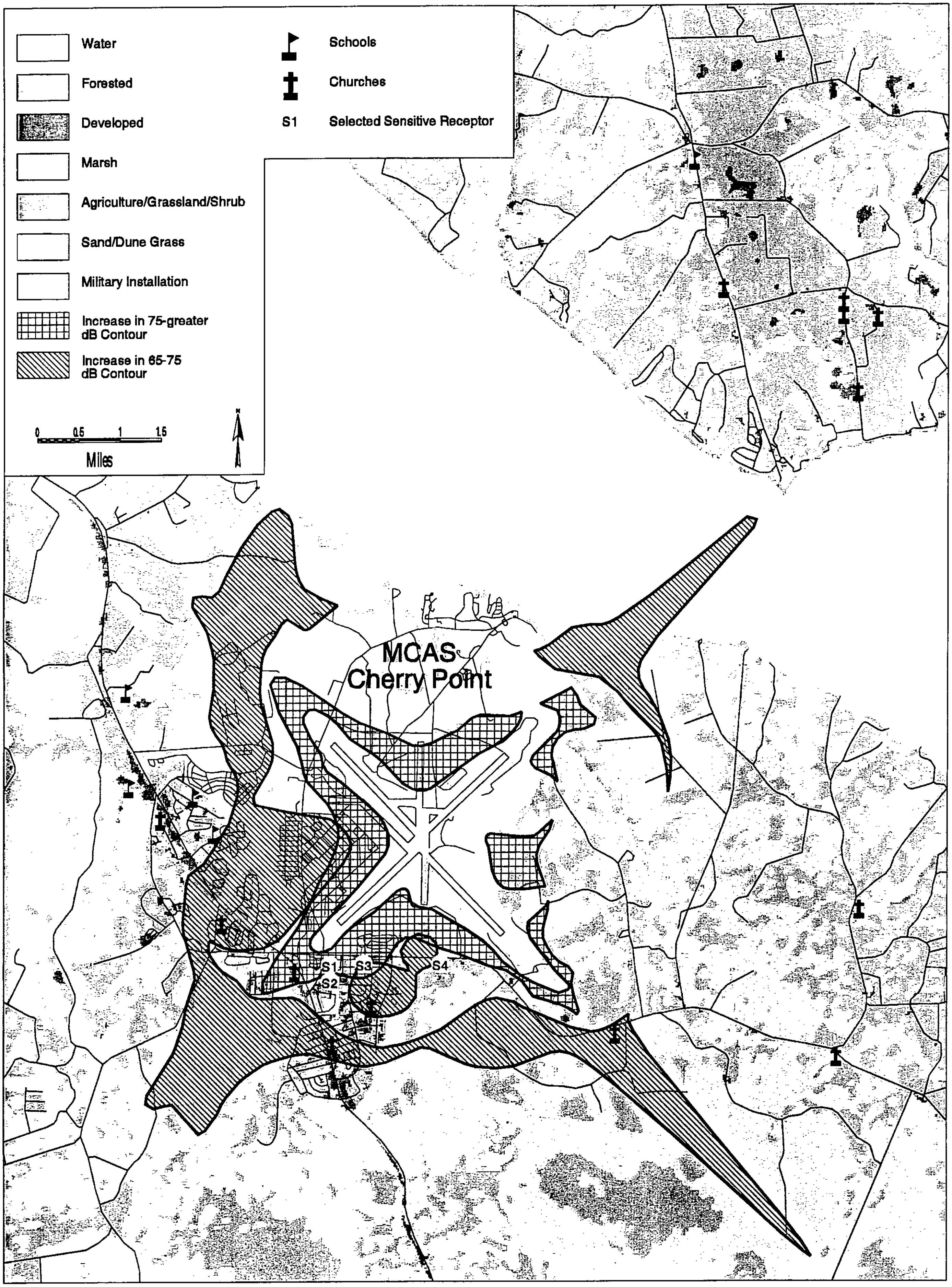
The term "new home" includes new construction, existing homes less than one year old, and existing homes that have been substantially remodeled. HUD, FHA, or VA mortgage policies may also impose conditions on mortgage loan guarantees (such as written

Table 6.1-2

LAND USE WITHIN EXISTING (1988) AND PROJECTED (1999) APZs
AT MCAS CHERRY POINT
ARS 3

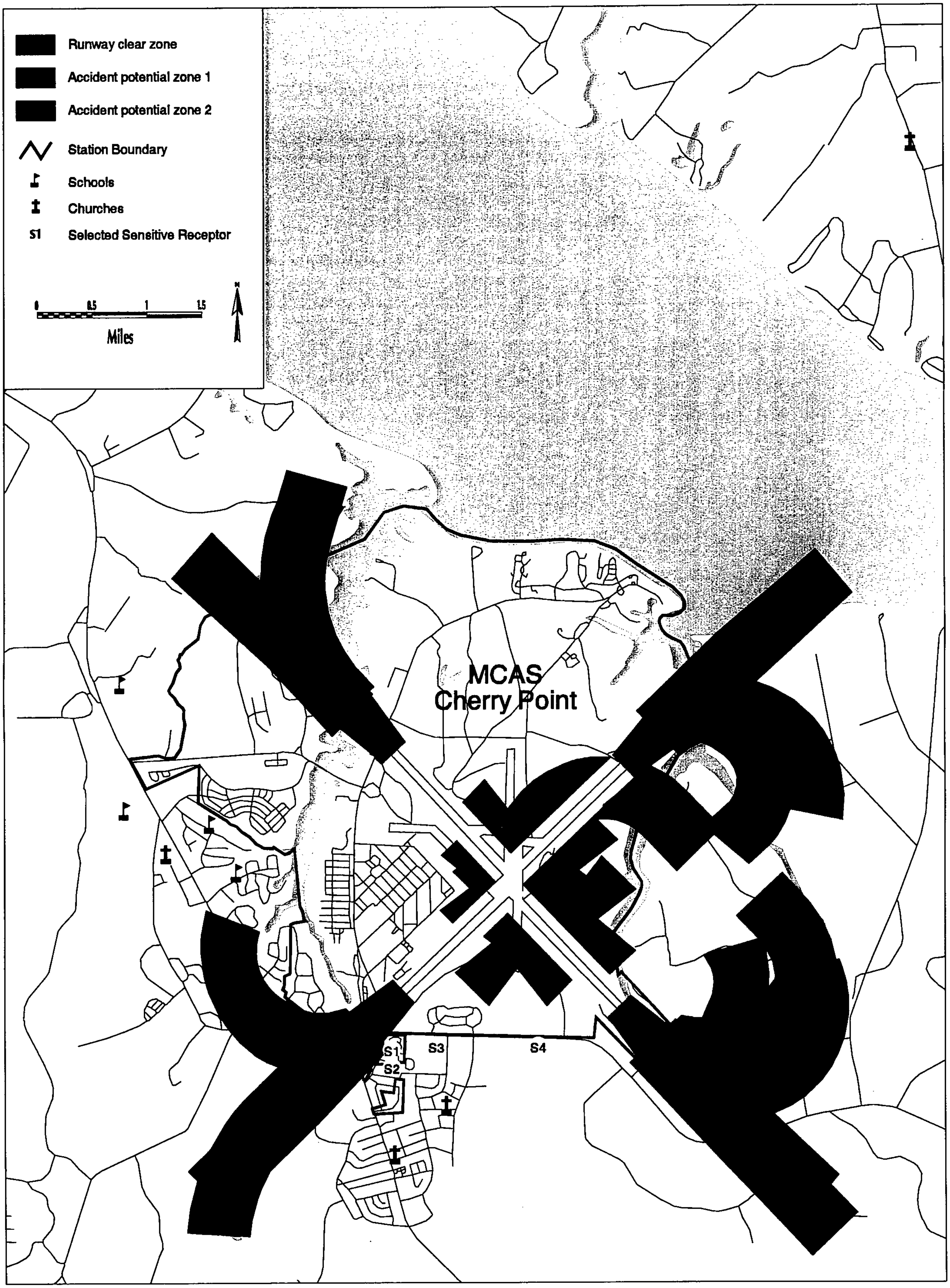
Land Use	1988 Acres Impacted	1988 Hectares Impacted	Projected Acres Impacted[a]	Projected Hectares Impacted	Change in Acres/ Hectares
Clear Zone					
Military Installation[b]	515	210	1,457	590	942/380
Agriculture/Grassland/Shrub	3	1	18	7	15/6
Developed	1	<1	1	<1	0/0
Marsh	1	<1	3	1	2/1
Water	0	0	7	3	7/3
Forested	0	0	1	<1	1/<1
APZ 1					
Marsh	205	83	499	201	294/118
Forested	377	152	494	200	117/48
Agriculture/Grassland/Shrub	273	110	211	85	-62/-25
Military Installation	537	218	695	281	158/63
Developed	54	22	60	24	6/2
Water	80	32	86	34	5/2
APZ 2					
Military Installation	334	135	455	184	121/49
Forested	1,552	628	2,395	969	843/341
Agriculture/Grassland/Shrub	598	242	395	160	-203/-82
Water	371	150	432	176	61/26
Marsh	364	147	846	342	482/195
Developed	66	26	66	26	0/0
Total	5,331	2,156	8,120	3,283	2,789/1,127

[a] Includes existing APZs, plus APZ increases under this ARS.
[b] Military installation defines all land use within the station.



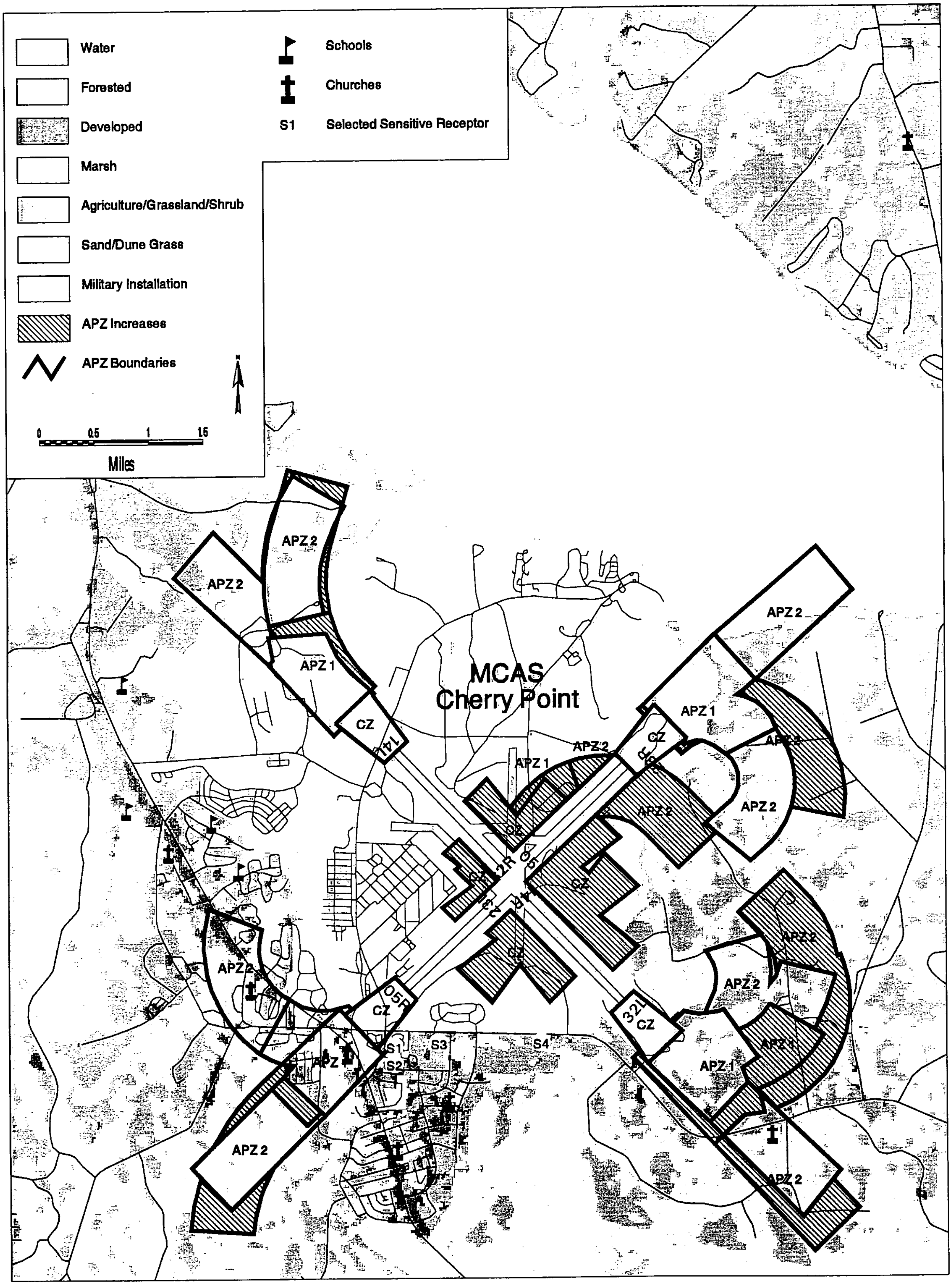
Source: NC Center for Geographic Information and Analysis 1996; Wyle Labs 1997; LANTDIV 1988

Figure 6.1-1
ARS 3 - Increase Between Existing AICUZ Boundaries and Projected 1999 Noise Contours and Land Use
MCAS Cherry Point



Source: Wyle Labs 1997

Figure 6.1-2
ARS 3 - Projected 1999 APZs
MCAS Cherry Point



Source: NC Center for Geographic Information and Analysis 1996; Wyle Labs 1997

Figure 6.1-3
ARS 3 - Increase Between Existing AICUZ and Projected 1999 APZs and Land Use
MCAS Cherry Point

acknowledgment of noise conditions) for existing homes located within noise contours of 75 dB Ldn or greater or within clear zones.

6.1.5 Socioeconomics and Community Services

6.1.5.1 Population, Employment, Housing, and Taxes/Revenues

The proposed realignment of three F/A-18 aircraft squadrons to MCAS Cherry Point under ARS 3 would have only a minor impact on the total personnel loading at the station and in the four-county area surrounding the station. The realignment of these three squadrons would result in the relocation of approximately 800 military personnel to MCAS Cherry Point.

Communities in the four-county area would be impacted in a similar fashion. When the average size of military households is considered, a total of 1,750 new residents would move into the region as a result of the proposed relocation under ARS 3. Assuming that the relocating personnel and their families would have a similar geographical distribution as the existing personnel assigned to the station, the majority of these residents would live in Craven County, with a portion of the Craven County residents living in the City of Havelock. Table 6.1-3 shows the projected population change for each of the four counties surrounding the station and the City of Havelock.

Because the majority of the personnel are expected to relocate to Craven and Carteret counties, the most populous counties in the region, the proposed realignment would not have significant impact on the demographic characteristics of these communities. The proposed relocation is anticipated to increase the total population of Craven County by 1.5% and Carteret County by 0.5%.

Economy, Employment, and Income

ARS 3 would have a long-term, positive impact on the economy of the four-county area surrounding the station. Total direct military employment would increase by approximately 800 military personnel over current levels. As a result, MCAS Cherry Point would inject approximately $30 million into the regional economy each year through military payroll expenditures. Additionally, in order to accommodate the relocating aircraft and personnel, approximately $119 million in construction and renovation expenditures would be made at MCAS Cherry Point (see Table 6.1-4).

As described for other ARSs, this injection of funds would stimulate the regional economy and the positive economic impacts would be "multiplied" as they are cycled through

Table 6.1-3

SOCIOECONOMIC IMPACTS OF THE PROPOSED REALIGNMENT OF THREE F/A-18 AIRCRAFT SQUADRONS TO MCAS CHERRY POINT UNDER ARS 3[a]

	Havelock[b]	Craven	Carteret	Jones	Pamlico	Other	Total Effects[d]
Population Impacts							
Total military personnel relocating	140	600	140	10	10	40	800
Number of military dependents	180	710	170	10	10	50	850
Total Population Change	**320**	**1,310**	**310**	**20**	**20**	**90**	**1,750**
Personnel and Regional Housing Impacts							
Total officers relocating	10	70	10	0	0	0	80
Total enlisted personnel relocating	130	530	130	10	10	40	720
Total Military Households Relocating	**140**	**600**	**140**	**10**	**10**	**40**	**800**
Fiscal Impacts							
Total population change	320	1,310	310	20	20	90	1,550
Local per capita tax contribution	$87	$414	$562	NA	NA	NA	NA
Estimated Change in Local Tax Contributions	**$27,840**	**$542,340**	**$174,220**	**$0**	**$0**	**$0**	**$744,400**
Education Impacts[c]							
Total elementary school-age children	NA	180	50	0	0	10	240
Total middle school-age children	NA	60	10	0	0	0	70
Total high school-age children	NA	40	10	0	0	0	50
Total Number of School-age Children	**NA**	**280**	**70**	**0**	**0**	**10**	**360**

[a] All figures have been rounded to the near ten. Totals may not add due to rounding errors.
[b] City of Havelock figures are included in Craven County statistics and, therefore, should not be double counted in the totals.
[c] School-age children residing in the City of Havelock attend Craven County Public Schools.
[d] Total effects summation includes statistics from the four-county and other columns. Also see Note b.

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Table 6.1-4

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF 3 F/A-18 SQUADRONS TO MCAS CHERRY POINT UNDER ARS 3

Direct Economic Impacts	
Increase in Military and Civilian Payroll	$30,000,000
Construction Expenditures	$119,000,000
Total	$149,000,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$15,600,000
Employment Opportunities (jobs)	750

a Indirect economic impacts have only been calculated for construction expenditures.

the economy. The RIMS II model was used to quantify the total impacts associated with this additional economic activity. As shown on Table 6.1-4, the $119 million construction program that would be completed at MCAS Cherry Point would generate approximately $15.6 million in additional employee earnings and create approximately 750 additional new jobs in the region. When the impacts associated with the increase in military payroll are included, the positive economic effects would become greater.

Housing

The proposed relocation of 800 additional military personnel to MCAS Cherry Point under ARS 3 would have a moderate impact on military and off-station housing. Demand for all forms of military-controlled housing would increase, including the demand for bachelor enlisted and bachelor officer housing.

However, MCAS Cherry Point's BEQs and BOQs would have sufficient capacity to handle the increase in personnel. Currently there are approximately 200 spaces available in the BEQs at MCAS Cherry Point and there are another 260 BEQ spaces filled by geographical bachelors. Because geographical bachelors are only allowed to live in bachelor housing on a space-available basis, the existing facilities at MCAS Cherry Point could house nearly 65% of the total enlisted personnel relocating. Because most of the senior enlisted personnel prefer to reside off-station and a large number of the relocating enlisted personnel are married, and therefore not eligible for bachelor accommodations, existing BEQ facilities should be more than adequate to handle any increase in demand for these units. If it is assumed that 20% of

all enlisted personnel relocating to MCAS Cherry Point would choose to live in the BEQs, then approximately 145 personnel would live on-station. The remaining bachelor enlisted personnel would live in the local community.

Likewise, BOQ facilities would be more than adequate to handle the additional officers who would be relocating to MCAS Cherry Point. If the spaces currently occupied by geographical bachelors were utilized, in addition to the vacant units, more than 20 officer billets could be made available for the relocating personnel. Because the majority of officers prefer to reside off-station and a large proportion of all officers are married, the 20 spaces should be more than adequate to handle any additional demand for bachelor officer housing.

The relocation of 800 military personnel would lead to an increase of approximately 430 military households requiring family housing. These additional 430 families would increase the demand for military-controlled family housing. However, given the relatively few personnel who would relocate to the station under ARS 3, and the fact that most military-controlled units at MCAS Cherry Point have relatively short waiting lists, little impact would occur. The primary impact to the military-controlled housing would be the increase in the demand for the units and a corresponding increase in the length of time a marine/sailor would have to wait for a unit. Although the additional 430 families moving into the region would increase the demand for military family housing, the supply of these units is not expected to increase. Currently, all adequate military family housing at MCAS Cherry Point is being utilized to the maximum extent practicable. Therefore, it is assumed that all of the relocating families would reside in the local community.

Similarly, the proposed relocation of 800 households (bachelor and family) to the four-county area around the station would have only a minor impact on the regional housing market. The additional personnel would increase the demand for housing units, especially rental units. However, given the relatively small number of households relocating compared to the total number of housing units available in the region, the proposed relocation would not have a significant effect on the supply or price of houses in the area.

Taxes and Revenues

The proposed realignment of three F/A-18 aircraft squadrons to MCAS Cherry Point under ARS 3 would have a positive impact on the generation of tax revenues in the region and in North Carolina as a whole. Because most of the relocating personnel currently reside outside of North Carolina, any state or local taxes these individuals pay would represent an increase in tax revenues for the state. In addition, sales tax and corporate income tax would increase as a direct result of the positive economic impacts of the realignment.

As described in previous sections, the proposed transfer would result in a net increase of 1,300 new residents in Craven County, with 320 of these residents residing in the City of Havelock. Local government revenue generated annually by these new residents would be approximately $542,000 and $28,000, respectively (see Table 6.1-3).

The increase in the total population of the region would result in an increase in the demand for communities services and facilities. In particular, the increase in school-age military dependents would lead to an increase in total school expenditures. Districts that would be significantly impacted by the increase in federally-connected students may receive additional impact aid from the U.S. Department of Education. This would cover a portion of the average costs per student.

Because there would be no additional military family housing constructed to house these relocating personnel and the existing military family housing units are filled to capacity, the additional families would be living on private property in the surrounding communities. Property taxes levied on these residences would help offset the increase in costs.

Because the Navy would spend additional funds via construction activities and procurement expenditures, the total amount of economic activity in the region would increase. As a result, additional employment, employee earnings, sales receipts, and economic output would all expand, leading to an increase in tax revenues.

As a result of all of these factors, communities in the region would not experience any significant adverse impacts from the implementation of ARS 3.

6.1.5.2 Community Services

Fire and Emergency Services

ARS 3 would not adversely affect the on-station or off-station provision of fire and emergency services. The existing staff and equipment in the MCAS Cherry Point Fire Department should be sufficient to handle any increased demand for their services on-station (Moore 1996).

Likewise, the proposed realignment would have little impact on the provision of fire and emergency services in the surrounding communities. Craven County currently has approximately 5.7 fire fighters and 2.7 emergency personnel per 1,000 residents. Following the proposed realignment these ratios are not expected to change, indicating no significant change in the level of service provided to county residents.

This also holds true in Carteret County. Currently there are approximately 10.7 fire fighters per 1,000 residents in the county. Upon completion of the proposed realignment this figure would remain constant at 10.7 fire fighters per 1,000 residents.

Security Services

ARS 3 would have little impact on the provision of security services at MCAS Cherry Point. However, the additional personnel assigned to the station would increase the number of passes that would have to be processed and the number of personnel who would have to be cleared at security checkpoints.

The influx of new residents to the region would not adversely affect the provision of security services in the nearby communities. The City of Havelock currently maintains a ratio of 1.1 police officers per 1,000 residents; Craven County has a ratio of 0.6 police officers per 1,000 residents; and Carteret County has a ratio of 0.8 police officers per 1,000 residents. These ratios would not change as a result of the relocation of the military families to the area, thereby indicating that no change in the level of service would occur.

Medical Services

Existing military and civilian hospitals and medical facilities on-station and in the region would not be significantly impacted by the implementation of ARS 3. Existing capacity at these facilities would be more than adequate to handle the additional civilians and military personnel that would relocate to the region.

Recreational Facilities

The projected increase of 800 military personnel stationed at MCAS Cherry Point under ARS 3 would not impact the provision of recreational facilities and services at the station. Although the additional personnel and their dependents would increase the demand for on-station facilities, the existing facilities should be more than adequate to handle this increased usage (Kearney 1996).

Education

The proposed realignment and the resulting population expansion would have a noticeable, but not significant, impact on the Craven County Public Schools and on the Carteret County Public Schools. Using the current demographic characteristics of the relocating squadrons and the existing geographical distribution of base personnel,

approximately 280 additional children would attend the Craven County Public Schools and 70 additional students would attend the Carteret County Public Schools. The majority of these additional students would attend elementary school, with only a small proportion of these students attending middle school or high school. In Craven County, approximately 180 additional elementary students; 60 middle school students and 40 high school students would relocate to the area as a result of the proposed realignment (see Table 6.1-3).

The impact of these additional students would be somewhat tempered by the relative size of the school districts and by the fact that the districts have sufficient excess physical capacity to handle the increase in students. The additional 280 students in the Craven County Public Schools would represent a 1.9% increase in total enrollment, and the 70 additional students in the Carteret County Public Schools would represent a 0.8% increase.

Current enrollment and capacity statistics of the two districts show that Craven County Public Schools could accommodate approximately 1,030 additional students and Carteret County Public Schools could accommodate approximately 290 additional students. Once the current school construction programs are completed, the total excess capacity of these districts would increase.

6.1.6 Infrastructure

6.1.6.1 Water Supply

The implementation of ARS 3 would result in the transfer of approximately 800 military persons to MCAS Cherry Point. It is estimated that roughly 25% of enlisted personnel being transferred under ARS 3 (180 personnel), would reside at the station. Because there is currently a waiting list for family housing, no net increase in on-station family housing population, and thus water consumption, is projected under ARS 3.

According to personnel at MCAS Cherry Point, daily water usage is roughly 3.4 MGD at the station. The station's water distribution and treatment system has the capacity to provide 6 MGD. Therefore, excess water capacity is 2.6 MGD. If 180 additional military persons live on-station, and a daily water usage of 80 gallons per person is assumed, the station's water demand will increase by roughly .0144 MGD. Additionally, if it is assumed that during an average work day, personnel working at MCAS Cherry Point use approximately 30 gallons of water per person, then the increase in daily water consumption by an additional 800 personnel is expected to be 0.024 MGD. Therefore, the net increase in water usage at MCAS Cherry Point under ARS 3 would be 0.038 MGD. The station's water distribution and treatment system has sufficient capacity to support this increase.

With dependents, the net increase of 800 personnel transferred to MCAS Cherry Point would result in an estimated total increase of 1,750 persons in the region. Based on demographic data, approximately 320 persons would reside in the City of Havelock, 990 would reside in Craven County (excluding those residing in Havelock), and 310 would reside in Carteret County. The remaining persons would be distributed among other parts of the region.

According to data provided by the NCDEHNR, gross water usage for the region is estimated to be 72 gallons per person per day (GPD). Assuming an additional 320 persons would reside in the City of Havelock, the daily increase in water usage would be roughly 0.023 MGD. With an excess water well pumping capacity of approximately 1 MGD, a surplus storage capacity of 0.8 million gallons, and plans for the construction of a fifth groundwater well, the city would have adequate capacity to serve this new demand.

Assuming an additional 990 persons would reside in Craven County and 310 persons in Carteret County, the daily increases in water usage would be 0.071 MGD and 0.022 MGD, respectively. Because the Craven County water system only serves part of the county, the demand would be spread among the county, municipal, and private water systems. For those persons residing within areas serviced by the county's water system there is sufficient capacity for new demand. For areas outside these service regions, there would also be sufficient water capacity to support new demand; the Castle Hayne and Black Creek formations have good water quality and large water volumes.

As stated in Section 3.3.6.2, Carteret County does not operate a water system and the majority of residents rely on private well systems, which are permitted NCDEHNR. Because demand would be distributed across the county, these systems would not be significantly impacted.

6.1.6.2 Wastewater System

As stated in Section 3.3.6.2, MCAS Cherry Point maintains a sewage treatment plant with a design flow capacity of 3.32 MGD and a NCNPDES permit discharge rate of 3.5 MGD. The wastewater treatment plant processes approximately 3 MGD of wastewater; therefore, excess capacity in the system is 0.32 MGD. Assuming wastewater generated equals 80% of the water consumed (ICMA 1988), approximately 0.030 MGD of additional wastewater will be generated. Therefore, the station would have the capacity to handle the projected increase.

The City of Havelock wastewater treatment plant has a design flow of 1.5 MGD which is expected to be increased to between 2.25 and 2.5 MGD by January 1998. With a

current average flow of 1.25 MGD, the city has sufficient capacity to meet the 0.018 MGD in new demand associated with ARS 3.

Unincorporated areas of Craven and Carteret counties rely principally on septic tanks to provide wastewater treatment. Areas in municipalities or special sewer districts use central sewer systems for wastewater disposal. Because of the multiple methods and service providers for wastewater treatment, no individual system or method of wastewater treatment would be significantly impacted by ARS 3.

6.1.6.3 Stormwater

Under the North Carolina Coastal Zone Management Program, disturbance to one or more acres, or construction activities requiring a sediment control and erosion plan, are required to provide stormwater quality control designed to result in an 80% reduction in suspended particles prior to stormwater discharge from the site. Stormwater quality control facilities would be incorporated into the construction plans for the new AIMD facility under ARS 3. The reduction in suspended particles would be accomplished through on-site retention. Stormwater from the AIMD site will discharge into Sandy Branch Creek, which is a tributary of the east prong of Slocum Creek (McSmith 1996). Although the quantity of stormwater runoff would be slightly increased by the construction of the AIMD facility, it would not have a significant impact on water resources.

Because the renovation projects will not add additional impervious surface, no quality control programs are required and no stormwater impact is expected. There is potential for the degradation of stormwater runoff due to additional aircraft operation activities; however, the station maintains a system of oil and water separators in potential areas of concern. In addition, through stormwater system upgrades and the enforcement of the station's Stormwater Pollution Prevention Plan, any additional stormwater runoff would not pose a significant impact.

6.1.6.4 Electrical

As stated in Section 3.2.6.4, the Carolina Power and Light Company supplies power directly to the MCAS Cherry Point, Slocum Village, Hancock Village, and the Staff Townhouse area. Although electric usage at the station sometimes approaches the peak capacity load of 42 megawatts and the 20-megawatt substation is approaching capacity limits, the station's electric system would to be able to support the new demand created by implementation of ARS 3.

6.1.6.5 Heating

The proposed hangar renovation projects and the new AIMD facility under ARS 3 would not require any significant alterations to the existing steam distribution system because the proposed renovation and new construction sites are already serviced by the steam distribution system. The Central Heating Plant has adequate capacity to provide steam-generated heat and process steam as required.

6.1.6.6 Jet Fuel

With the limited number of new aircraft proposed for realignment to MCAS Cherry Point under ARS 3, the existing jet fuel distribution system would have sufficient capacity to support the additional aircraft (Toocker 1996).

6.1.6.7 Solid Waste Management

According to personal at the Tuscarora Landfill, the per capita solid waste generation rate for the region is 0.574 tons (0.521 metric tons) per person per year (Dietz 1996). Therefore, with a realignment of approximately 1,750 persons into the region under ARS 3, the increase in total solid waste generated is expected to be roughly 1,004 tons (910 metric tons) per year. If the state mandate of a 40% reduction in waste disposed in landfills is accomplished, additional solid waste disposed of in landfills would be approximately 533 tons (484 metric tons) per year under ARS 3. Based on the existing available capacity and expansion plans, ARS 3 would not significantly impact capacity at the Tuscarora Regional Landfill (Dietz 1996).

6.1.7 Transportation

ARS 3 would result in small increases in traffic generated on and around MCAS Cherry Point. Based upon projected increases in station population, ARS 3 would create approximately 1,600 new daily automobile trips on station and regional roads. The following sections describe the implications of this relatively small increase in traffic loads.

6.1.7.1 Regional Road Network

Roadways in the vicinity of MCAS Cherry Point exhibit sufficient capacity to handle the increased traffic volumes that would be associated with the realignment of three F/A-18 squadrons under ARS 3.

Projections of traffic volumes on roadways within the area were generated based on an annual growth rate of 3.5%, based on growth in recent years. Table 6.1-5 and Figure 6.1-4 display projected future traffic without the realignment activities as well as projections reflecting traffic generated by realignment activities under ARS 3.

As the table shows, US 70 has enough excess capacity to sufficiently handle projected future traffic volumes associated with ARS 3. Based on these projections, LOS would not degrade below a level of C.

Considering the relatively uninterrupted flow and low traffic volumes on NC 101, traffic would continue to operate well below the roadway's capacities, represented by LOSs of A or B on all segments near the station.

6.1.7.2 Station Road Network

Projected traffic resulting from ARS 3 would not significantly impact the operation of the on-station roadway network at MCAS Cherry Point. This network has sufficient excess capacity to accommodate the additional traffic that would be generated under ARS 3.

6.1.7.3 Planned Road Improvements

Modest traffic growth associated with ARS 3 would not affect the feasibility of planned road improvements in the vicinity of MCAS Cherry Point.

6.1.8 Noise

Long-term changes in noise exposure levels around MCAS Cherry Point would result from the increased F/A-18 aircraft operations associated with ARS 3. These noise impacts would result in significant impacts on people living near the air station.

The Navy conducted an aircraft noise study to examine the impacts resulting from potential F/A-18 operations under ARS 3 (Wyle Labs 1997). As with previous noise studies conducted at the station, it involved the use of DoD's NOISEMAP model to project Ldn contours in 1999, when realignment under ARS 3 would be completed. A discussion of Ldn as a relevant noise metric is presented in Section 3.1.8 and Appendix H. Figure 6.1-5 depicts projected AAD Ldn contours compared to existing AICUZ noise contours. As shown, both the 65 to 75 dB and 75 dB and greater Ldn contours cover greater areas than the respective AICUZ contours.

Table 6.1-6 compares the estimated area and population within AICUZ contours to projected 1999 noise contours under ARS 3. The projected 1999 65 to 75 dB noise contour

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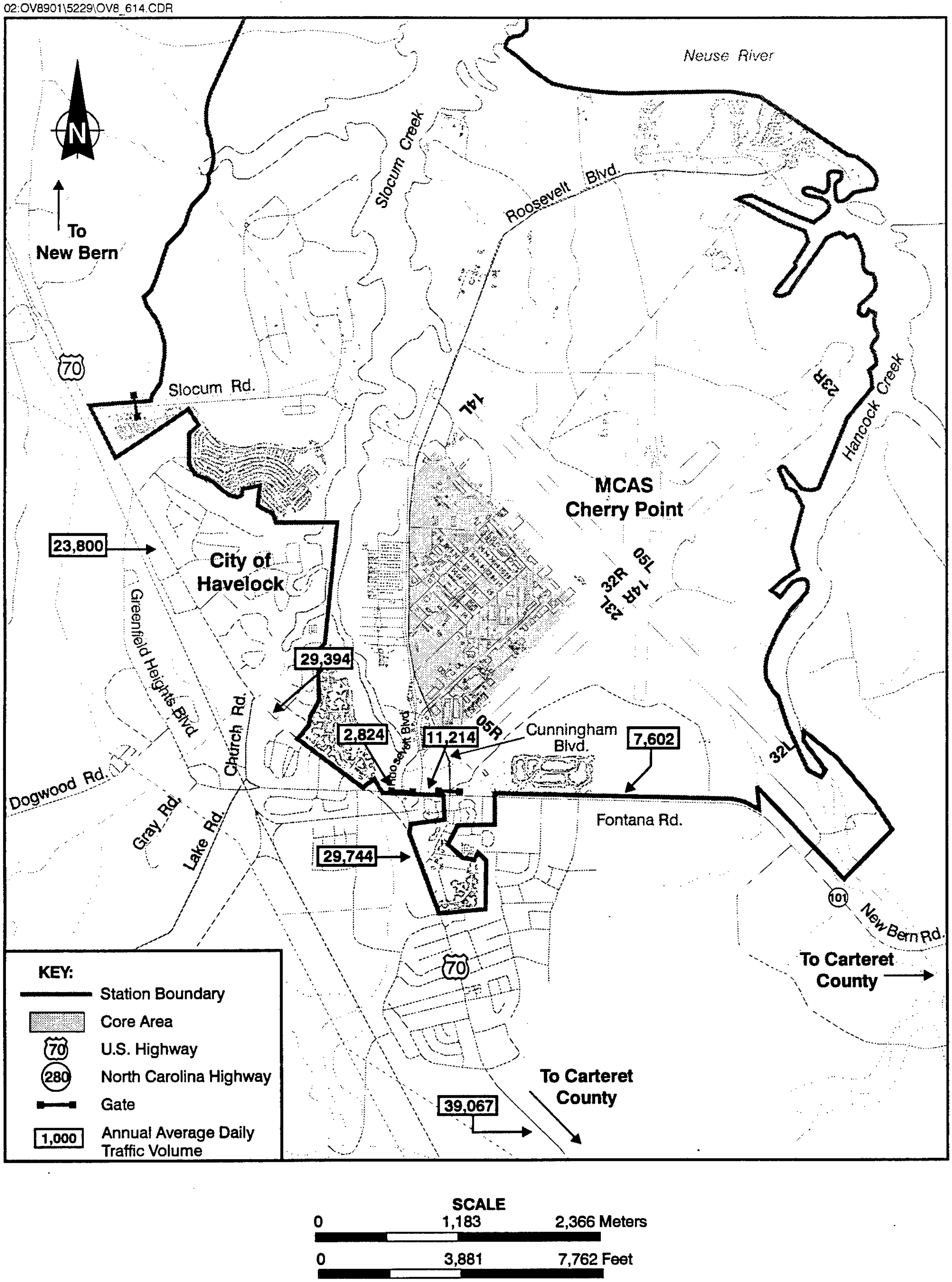

Figure 6.1-4 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING MCAS CHERRY POINT FOLLOWING REALIGNMENT UNDER ARS 3

Table 6.1-5

PROJECTED TRAFFIC CONDITIONS ON ROADS IN THE VICINITY OF MCAS CHERRY POINT ASSOCIATED WITH ARS 3

Road	Segment	AADT Without Realignment 1999[a]	LOS	AADT With Realignment 1999[a]	LOS
U.S. 70	Greenfield Heights Blvd to Church Road	23,074	B	23,800	B
U.S. 70	Church Road to Jackson Road	28,668	B	29,394	B
U.S. 70	Jackson Road to NC 101 (Fontana Rd)	41,254	C	41,980	C
U.S. 70	NC 101 (Fontana Rd) to Cunningham Blvd	29,018	B	29,744	B
U.S. 70	Cunningham Blvd towards east (Carteret County)	38,341	C	39,067	C
NC 101 (Fontana Rd)	US 70 to Crocker/Roosevelt Road	2,098	B	2,824	B
NC 101 (Fontana Rd)	Crocker/Roosevelt Road to Cunningham Blvd	10,488	B	11,214	B
NC 101 (Fontana Rd)	Cunningham Blvd towards east (New Bern)	6,876	A	7,602	A

a These volumes have been projected using an annual 3.5% growth rate (U.S. Navy 1994).

Note: LOS based on Generalized Annual Average Daily Volumes for Area's Transitioning into urbanized areas as established in Level of Service Standards and Guidelines Manual for Planning (Florida Department of Transportation 1995).

Key:

A = Free-flow conditions.
AADT = Annual Average Daily Traffic.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds; however, low maneuverability.
E = Traffic at capacity of segment; unstable flows with little or no maneuverability.
F = Forced-flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
LOS = Level of service.

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Table 6.1-6

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1988 AICUZ AND PROJECTED 1999 NOISE CONTOURS MCAS CHERRY POINT - ARS 3

Ldn	1988 AICUZ		1999 Noise Contours		New Area/Population Exposed Relative to 1988 AICUZ[a]	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	5,265 (2,130)	1,529	7,290 (2,950)	2,988	2,883 (1,166)	1,746
75 dB or greater	321 (130)	29	493 (200)	293	237 (96)	235
Total	5,586 (2,260)	1,558	7,783 (3,150)	3,281	3,120 (1,263)	1,981

Note: Numbers exclude water areas.

[a] Represents only new area/population that previously were not exposed to listed noise levels under 1988 AICUZ. Does not equal the difference between 1988 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.

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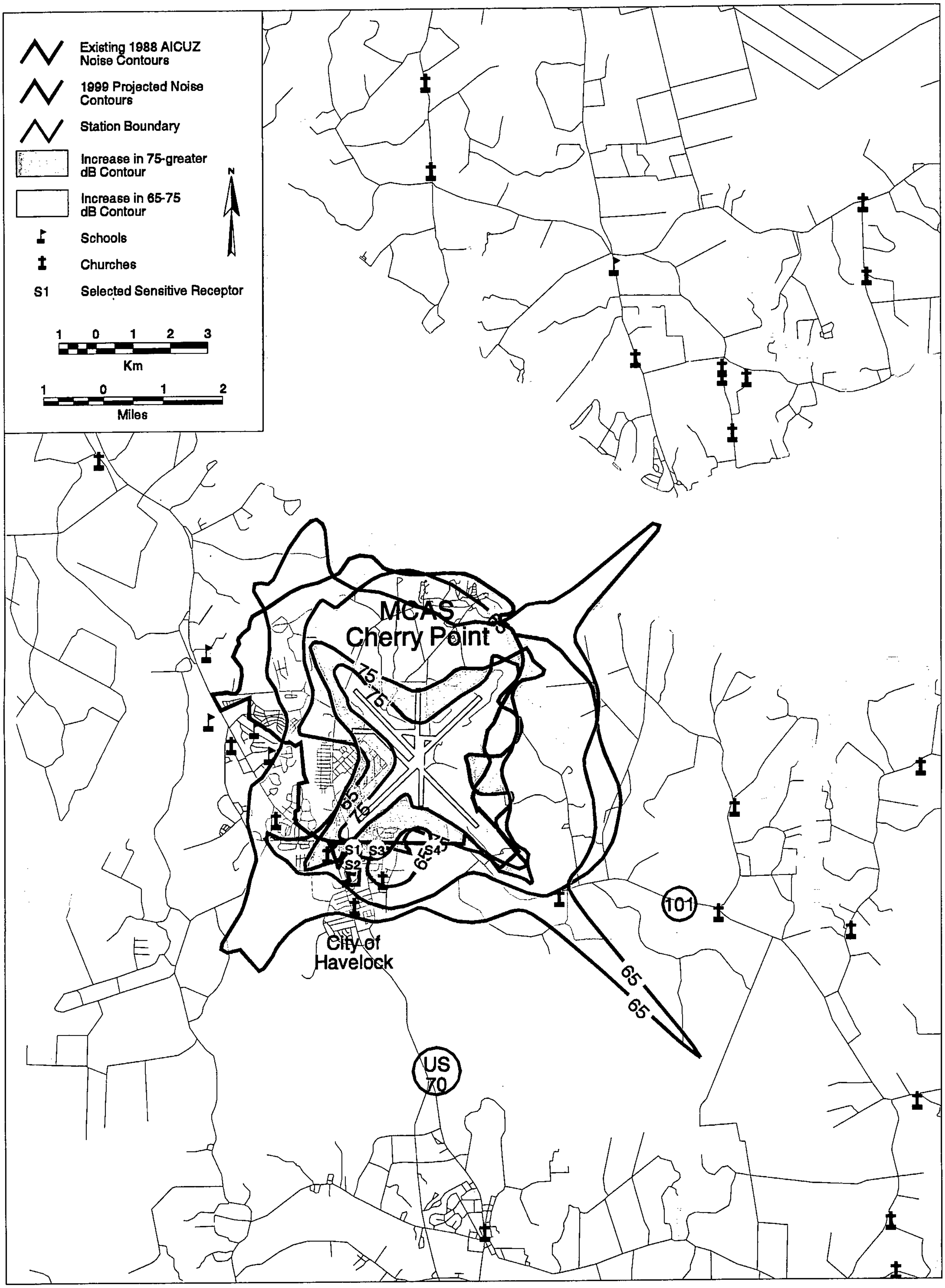

Source: LANTDIV 1988, Wyle Labs 1997

Figure 6.1-5
ARS 3 - Comparison of Existing and Projected 1999 Average Annual Day Noise Contours
MCAS Cherry Point

for ARS 3 would cover an area of 7,290 acres (2,950 hectares), with an estimated population of 2,988 people. The 75 dB or greater contour would cover an area of 493 acres (200 hectares), with an estimated population of 293 people (Wyle Labs 1997). New areas exposed to an Ldn of 65 to 75 dB would cover 2,883 acres (1,166 hectares) with an estimated population of 1,746 persons. New areas exposed to an Ldn of 75 dB or greater would cover 237 acres (96 hectares), with an estimated population of 235 people. A discussion of human health noise-related impacts and protection standards is presented in Section 4.8. Table 6.1-7 presents the decrease in area and population noise exposure relative to the 1988 AICUZ. An estimated population of 67 people would experience a reduction in noise levels due to existing flight tracks and runway utilization.

Table 6.1-8 presents projected site-specific Ldn at schools located within the 65 Ldn or greater Ldn contour. The projected impacts at these locations vary, ranging from a 1 to 4 dB increase over existing conditions (Wyle Labs 1997). Schools are considered compatible with outside noise levels between 65 and 75 Ldn only if they have sufficient sound attenuation to reduce interior noise levels to approximately 45 dB. To analyze potential noise impacts to schools, the school-day (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) Leq was calculated for 1999 conditions for those schools expected to be within the 65 dB or greater Ldn (see Table 6.1-8). Use of central air conditioning systems in association with closed windows normally reduces noise levels by approximately 25 dB. Therefore, school sites with a 1999 exterior Leq of 70 dB or less would likely experience minimal interference. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at those schools of particular concern.

The maximum sound levels of typical F/A-18 events similar to those that would be conducted at MCAS Cherry Point are shown in Table 6.1-9. Levels for AV-8s are also presented for comparative purposes. The anticipated number of average daily operations by event is presented in Table 6.1-10.

The noise contours presented in Figure 6.1-5 represent the projected flight operation plan. MCAS Cherry Point continually evaluates noise mitigation options to reduce noise impacts on the local community. These include evaluations of:

- Arrival and departure procedures;
- Airfield hours of operation;
- Pattern altitudes;

Table 6.1-7

DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE
RELATIVE TO 1988 AICUZ
MCAS CHERRY POINT ARS 3

Reduction in Ldn	Area in Acres (Hectares)	Estimated Population
75+ to 65 - 75 dB	-79 (-32)	-7
65 - 75 to <65 dB	-700 (-283)	-60
Total	-779 (-315)	-67

Note: Numbers exclude water areas.

Key:

Ldn = Day-night average sound level.

Table 6.1-8

SCHOOLS WITHIN PROJECTED 1999 NOISE CONTOURS GREATER THAN 65 Ldn

Identification Number[a]/Name		1997 Ldn (dB)	1999 Ldn (dB)	1999 Leq (dB)
S1	Havelock Elementary	74	75	74
S2	Havelock Middle	73	74	73
S3	Havelock High	76	77	76
S4	Roger Bell Elementary	66	70	67

Note: One school located near the departure end of Runway 32R is under construction.

[a] Schools are shown on Figure 6.1-5.

Key:

dB = Decibel.
Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

Table 6.1-9 MAXIMUM SOUND LEVELS AT RECEPTORS WITH AIRCRAFT AT 1,000 FEET AGL (decibels)		
	F/A-18	**AV-8**
Departures	108	85
Arrivals	104	88
Touch-and-Go	97	91
FCLP	97	NA

Table 6.1-10 MCAS CHERRY POINT PROJECTED AVERAGE DAY OPERATIONS FOR SELECTED F/A-18 EVENTS	
Departures	8
Arrivals	8
Touch-and-Go[a]	8
FCLP[a]	16

[a] Touch-and-go and FCLP sorties equal two operations each.

- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

MCAS Cherry Point would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation.

6.1.9 Air Quality

6.1.9.1 Air Regulations

Air quality is governed by the Clean Air Act and its implementing regulations. The primary regulations affecting ARS 3 at MCAS Cherry Point are the NAAQS. The station is located in the Southern Coastal Plain AQCR of North Carolina. This AQCR is designated attainment or unclassified/attainment for all criteria pollutants.

6.1.9.2 General Conformity Rule

As stated in Section 3.3.9, the area around MCAS Cherry Point is classified as attainment for all criteria pollutants. Therefore, air emissions at the station associated with ARS 3 are exempt from the General Conformity Rule.

6.1.9.3 Projected Emissions at MCAS Cherry Point

Projected emissions for MCAS Cherry Point are presented in Table 6.1-11. An increase in air pollutant emissions is projected to occur primarily due to increased flight activity at MCAS Cherry Point and maintenance requirements (engine testing) for the three additional squadrons. Aircraft operation projections for 1999 (ATAC 1997) and emission factors and methods described in Appendix E were used to project emissions.

Stationary source emissions will not increase significantly due to the additional three squadrons. A Title V Air Permit to Operate issued by the NCDEHNR governs emissions from stationary sources at MCAS Cherry Point. There would be no emission increases under ARS 3 that would require further permitting by NCDEHNR because MCAS Cherry Point's Title V application includes provisions for increased emissions from aircraft maintenance activity (stationary sources) due to the basing of additional squadrons.

Estimated emissions in 1999 for aircraft operations at MCAS Cherry Point are 307 tons per year of VOCs, 318 tons per year of NO_x, 1,080 tons per year of CO, 40 tons per year of SO_2, and 130 tons per year of PM_{10}. Stationary sources at Cherry Point contribute 31 tons per year of VOCs, 202 tons per year of NO_x, 68 tons per year of CO, 450 tons per year of SO_2, and 20 tons per year of PM_{10}.

6.1.9.4 Total Net Projected Emissions

The net change in emissions from 1997 to 1999 is shown in Table 6.1-12. Emissions increase 57 tons per year for VOCs, 51 tons per year for NO_x, 133 tons per year for CO, 4 tons per year for SO_2, and 7 tons per year for PM_{10}. These emission increases are minor when compared with allowable emission increases for permitting requirements in attainment areas. Generally, stationary sources emitting minor amounts of pollutants are not subject to rigorous air quality permitting because these emissions are assumed to not significantly affect air quality in the region surrounding the station.

Table 6.1-11

1999 AIR EMISSIONS SUMMARY FOR MCAS CHERRY POINT UNDER ARS 3
(tons per year)

Source Type	1999				
	VOCs	NO_x	CO	SO_2	PM_{10}
Mobile Sources					
Aircraft	306.72	318.27	1,080.48	40.33	129.67
GSE	0.06	0.73	0.16	0.05	0.05
Maintenance Run-ups	5.02	8.83	13.32	0.27	3.07
Total Mobile	311.79	327.84	1,093.96	40.64	132.79
Stationary Sources					
Boiler	0.93	190.52	60.11	449.48	11.68
Generators	0.35	4.63	1.26	0.54	0.22
Engine test cells	1.87	7.31	6.75	0.27	5.21
APU test cell	0.00	0.02	0.02	0.00	0.00
Fuel storage and handling	7.98	0.00	0.00	0.00	0.00
Painting	6.05	0.00	0.00	0.00	0.18
Parts cleaning	6.70	0.00	0.00	0.00	0.00
Miscellaneous	7.04	0.00	0.07	0.01	3.15
Total Stationary	30.90	202.49	68.21	450.30	20.44
Total Annual	342.70	530.33	1,162.17	490.94	153.23

Table 6.1-12 NET CHANGE IN AIR EMISSIONS BETWEEN 1997 AND 1999 MCAS CHERRY POINT (tons per year)					
Year	VOCs	NO_x	CO	SO_2	PM_{10}
1997	285.54	479.32	1,029.67	486.81	146.71
1999	342.70	530.33	1,162.17	490.94	153.23
Net Change: 1997 to 1999	57.16	51.01	132.50	4.13	6.51

6.1.10 Topography, Geology, and Soils

6.1.10.1 Topography

The proposed construction and operations under ARS 3 would not impact topography.

6.1.10.2 Geology

The proposed construction and operations under ARS 3 would not impact geologic resources underlying the station.

6.1.10.3 Soils

The overall effect on soils at the proposed project sites under ARS 3 would be minor and due primarily to short-term construction activities. Temporary impacts on soils would be associated only with the proposed AIMD facility and would include compaction and rutting by vehicular traffic and potential erosion of soils during the construction phase of the project. These will be lessened through implementation of standard soil erosion and sediment control measures.

6.1.11 Water Resources

6.1.11.1 Surface Water

Implementation of ARS 3 would not result in significant adverse effects to water quality. The majority of proposed apron alterations and hangar renovations would occur in already paved portions of the station, and would not affect streams adjacent to the station property. Minor, temporary impacts could occur from the potential runoff of soils into drainages near the flight line during construction of the AIMD facility. Following completion

of the project and stabilization of lands immediately surrounding the project area, the potential for these types of impacts would subside.

Potential surface water-quality impacts may result from runoff from facilities and aircraft support areas. Potential increases in contamination includes oil, grease, metals, and particulates from apron, hangar, and AIMD areas. Management of point and nonpoint pollution sources would be accomplished through the continued implementation of the station's Stormwater Pollution Prevention Plan.

6.1.11.2 Groundwater

No effects to the area's groundwater resources are expected as a result of the ARS 3. Neither the availability of groundwater in the area nor the quality of the water withdrawn would be affected.

6.1.11.3 Wetlands

The proposed parking apron alterations, hangar renovations, and new AIMD facility under ARS 3 would occur in developed portions of the station. Wetlands on the station would not be affected by the proposed construction activities.

6.1.12 Terrestrial Environment

6.1.12.1 Vegetation

Because the construction of the proposed AIMD facility would result in alteration of a previously disturbed site (i.e., former troop housing), and because the parking apron alterations and hangar renovations would occur in paved areas, the proposed projects at MCAS Cherry Point under ARS 3 would not significantly affect vegetation at the station.

6.1.12.2 Wildlife

Proposed construction at MCAS Cherry Point under ARS 3 would not result in significant effects to wildlife resources. Most of the areas proposed for development currently provide limited habitat for wildlife, except for those species tolerant of urban environments. Specifically, development of the new AIMD facility would disperse these species to surrounding areas during the construction phase of the project. Following completion of the facility, these species would reinhabit the site.

6.1.12.3 Threatened and Endangered Species

Threatened or endangered species identified on the station occur in areas beyond the limits of the proposed construction under ARS 3. No effects to threatened or endangered species would result from the proposed construction or air operation activities.

6.1.13 Cultural Resources

6.1.13.1 Archaeological Resources

No archaeological resources listed on the NRHP or eligible for listing on the NRHP would be impacted by the projects under ARS 3. All projects occur on significantly disturbed surfaces (Hargrove et al. 1984).

6.1.13.2 Architectural Resources

Under ARS 3, Building 1665 would be affected by renovations, and Building 1700 would be affected by renovations and alterations. These buildings are not eligible for listing on the NRHP, and no mitigative measures are required. Building 131, also slated for alteration, has been determined to be not eligible for listing on the NRHP (R. Christopher Goodwin and Associates 1996). The North Carolina Division of Archives and History is currently reviewing this determination.

6.1.14 Environmental Contamination

6.1.14.1 Hazardous Materials and Waste Management

Realignment of three F/A-18 squadrons under ARS 3 would increase the use of hazardous materials and the generation of hazardous waste at MCAS Cherry Point because of the maintenance and repair activities associated with the aircraft. However, this is not a significant impact because MCAS Cherry Point currently manages hazardous waste in compliance with a Resource Conservation and Recovery Act (RCRA) Part B Permit, and Air Station Order 5090.5, Handling, Transfer, and Disposal of Hazardous Materials and Hazardous Waste.

The amount of increased hazardous waste generated is estimated to be approximately 11,500 lbs/year (5,216 kilograms/year), which is less than 1% of the amount generated by the station (including the tenant activities) in 1995. This estimate was derived by calculating the amount of waste generated, per squadron, by the 2nd MAW squadrons currently located at MCAS Cherry Point. The 2nd MAW generated approximately 90,514 lbs. (41,057 kilograms) in 1995, of which 38,116 lbs. (17,289 kilograms) are attributed to the 10 squadrons

(Hudson 1996). Therefore, hazardous waste generated is estimated to be approximately 3,800 lbs. (1,724 kilograms) per squadron. This increase can be accommodated within existing hazardous waste management systems.

6.1.14.2 Installation Restoration Program

Investigative and remedial activities under the IRP may impact aircraft activities of the F/A-18 squadrons because (1) the location of the hangars proposed for use by the aircraft is within Operable Unit (OU) 1, and (2) remedial activities at OU1 will likely extend beyond the year 1999 (Brown & Root Environmental 1996b). However, this impact would not be significant because aircraft activities would be able to be conducted simultaneously with the investigative and remedial activities under the IRP.

6.2 Environmental Consequences and Mitigation Measures: ARS 3 at NAS Oceana

6.2.1 Airfield Operations

Airfield operations at NAS Oceana under ARS 3 would be slightly less than those experienced under ARS 1 (7%) and ARS 2 (5%). Table 6.2-1 presents projected airfield operations for ARS 3 derived from the NASMOD analysis for the station (ATAC 1997). A total of approximately 218,000 annual operations would be conducted at NAS Oceana. This represents a 100.5% increase over 1997 operations. A total of approximately 149,000 operations would be conducted at NALF Fentress. This would represent a 42% increase over 1997 operations. As with the other alternatives, these operations could be reasonably accommodated at each of these facilities (ATAC 1997).

6.2.2 Military Training Areas

6.2.2.1 Military Training Routes

Projected aircraft operations and noise levels along MTRs under ARS 3 are presented in Table 6.2-2. Operations along all MTRs would grow to 8,583, a 10% increase over 1997 levels. As under ARS 1, no MTR would experience a significant increase in either operations or noise levels (ATAC 1997; Wyle Labs 1997).

6.2.2.2 Warning Areas

Aircraft operations in warning areas adjacent to NAS Oceana under ARS 3 would be slightly less than those under ARS 1 (see Table 6.2-3). As under ARS 1, the overall operational efficiency of these airspace components would not be adversely impacted by implementation of ARS 3 (ATAC 1997).

6.2.2.3 Military Operating Areas

Operations in the Stumpy Point MOA under ARS 3 would be slightly less than those under ARS 1 (see Table 6.2-4). Total annual operations would decrease from 56 to 28.

6.2.2.4 Restricted Areas

Aircraft operations in restricted areas adjacent to NAS Oceana under ARS 3 would be slightly less than those under ARS 1 (see Table 6.2-5). As under ARS 1, the overall operational efficiency of these areas would not be impacted by implementation of ARS 3 (ATAC 1997).

Table 6.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 3

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
F-14 Fleet	Departure	13,225	12,176	1,105	13,281	
	Full Stop Visual Landing	12,700	11,295	1,465	12,760	
	Full Stop Instrument Landing	514	354	157	511	
	Visual Touch-and-Go/Low Approach	20,396	20,402	994	21,396	
	Instrument Touch-and-Go/Low Approach	570	472	56	528	
	Field Carrier Landing Practice	0	176	80	256	
	TOTAL	47,405	44,875	3,857	48,732	
F-14 FRS	Departure	6,947	6,534	450	6,984	
	Full Stop Visual Landing	6,308	5,924	399	6,323	
	Full Stop Instrument Landing	639	270	391	661	
	Visual Touch-and-Go/Low Approach	27,456	25,502	904	26,406	
	Instrument Touch-and-Go/Low Approach	5,234	3,698	1,612	5,310	
	Field Carrier Landing Practice	0	0	0	0	
	TOTAL	46,584	41,928	3,756	45,684	
F/A-18 Fleet	Departure	0	10,222	827	11,049	
	Full Stop Visual Landing	0	8,977	1,281	10,258	
	Full Stop Instrument Landing	0	590	213	803	
	Visual Touch-and-Go/Low Approach	0	17,786	1,512	19,298	
	Instrument Touch-and-Go/Low Approach	0	1,590	528	2,118	
	Field Carrier Landing Practice	0	220	660	880	
	TOTAL	0	39,385	5,021	44,406	

Table 6.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 3

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
F/A-18 FRS	Departure	0	8,066	473	8,539	
	Full Stop Visual Landing	0	6,900	674	7,574	
	Full Stop Instrument Landing	0	621	344	965	
	Visual Touch-and-Go/Low Approach	0	35,738	2,490	38,228	
	Instrument Touch-and-Go/Low Approach	0	4,484	616	5,100	
	Field Carrier Landing Practice	0	160	80	240	
	TOTAL	0	55,969	4,677	60,646	
Adversary	Departure	839	2,272	56	2,328	
	Full Stop Visual Landing	828	2,316	0	2,316	
	Full Stop Instrument Landing	5	11	1	12	
	Visual Touch-and-Go/Low Approach	436	1,522	0	1,522	
	Instrument Touch-and-Go/Low Approach	168	164	0	164	
	TOTAL	2,276	6,285	57	6,342	
Transient Jet	Departure	967	946	21	967	
	Full Stop Visual Landing	724	708	14	722	
	Full Stop Instrument Landing	243	243	2	245	
	Visual Touch-and-Go/Low Approach	1,078	1,042	22	1,064	
	Instrument Touch-and-Go/Low Approach	836	792	30	822	
	TOTAL	3,848	3,731	89	3,820	
Transient Prop	Departure	1,642	1,639	30	1,669	
	Full Stop Visual Landing	1,171	1,175	17	1,192	

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Table 6.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 3

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations Day 0700-2200	Night 2200-0700	Total	Percent Change
	Full Stop Instrument Landing	471	469	8	477	
	Visual Touch-and-Go/Low Approach	2,890	2,792	52	2,844	
	Instrument Touch-and-Go/Low Approach	2,610	2,556	42	2,598	
	TOTAL	8,784	8,631	149	8,780	
	AIRFIELD TOTAL	108,897	200,804	17,606	218,410	100.6
NALF Fentress						
F-14 Fleet	Field Carrier Landing Practice	38,640	23,520	14,960	38,480	
F-14 FRS	Field Carrier Landing Practice	23,280	15,900	8,100	24,000	
F/A-18 Fleet	Field Carrier Landing Practice	0	12,440	6,780	19,220	
F/A-18 FRS	Field Carrier Landing Practice	0	18,228	6,080	24,308	
E-2 Fleet	Departure	168	102	66	168	
	Full Stop Visual Landing	168	102	66	168	
	Field Carrier Landing Practice	16,464	9,996	6,468	16,464	
E-2 FRS	Departure	616	462	154	616	
	Full Stop Visual Landing	616	462	154	616	
	Field Carrier Landing Practice	16,368	12,276	4,092	16,368	
C-2 Fleet	Departure	112	106	6	112	
	Full Stop Visual Landing	112	106	6	112	
	Field Carrier Landing Practice	8,124	7,828	296	8,124	
	AIRFIELD TOTAL	104,668	101,528	47,228	148,756	42.1

Source: ATAC 1997.

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Table 6.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 3

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 3			Percent Change	1997 Ldnmr	1999 Ldnmr
			Day 0700-2200	Night 2200-0700	Total			
VR-0073	A-6	5	0	0	0		52	53
	AV-8B	199	509	4	513			
	EA-6B	39	38	1	39			
	F-14	61	28	0	28			
	F-15	601	589	12	601			
	F-16	72	72	0	72			
	F/A-18	6	6	0	6			
	T-38	4	4	0	4			
	Total	**987**	**1,246**	**17**	**1,263**	**28**		
VR-0085	AV-8B	0	29	1	30		<50	<50
	F-14	50	127	0	127			
	F-15	464	464	0	464			
	F-16	19	19	0	19			
	F/A-18	11	80	1	81			
	EA-6B	0	82	0	82			
	KC-130	0	32	0	32			
	Total	**544**	**833**	**2**	**835**	**53**		
VR-1040	A-10	9	9	0	9		52	52
	AV-8B	101	29	1	30			
	KC-130	28	32	0	32			
	EA-6B	78	82	0	82			
	F-14	0	127	0	127			
	F-16	520	520	0	520			
	F/A-18	18	80	1	81			
	Total	**754**	**879**	**2**	**881**	**17**		
VR-1043	A-6	405	0	0	0		55	<50
	AV-8B	64	23	0	23			
	KC-130	32	32	0	32			
	EA-6B	74	74	0	74			
	F-15	28	28	0	28			
	F-16	115	115	0	115			

Table 6.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 3

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 3			Percent Change	1997 Ldnmr	1999 Ldnmr
			Day 0700-2200	Night 2200-0700	Total			
	F/A-18	37	37	0	37			
	Total	**755**	**309**	**0**	**309**	-59		
VR-1046	A-10	9	9	0	9		57	<50
	A-6	363	0	0	0			
	AV-8	78	271	0	271			
	EA-6B	37	21	16	37			
	F-15	41	41	0	41			
	F-16	9	9	0	9			
	F/A-18	92	272	8	280			
	F-4	9	9	0	9			
	T-2	4	4	0	4			
	Total	**642**	**636**	**24**	**660**	3		
VR-1752	A-4	5	5	0	5		50	<50
	A-6	179	0	0	0			
	AV-8B	6	29	1	30			
	C-17	1	1	0	1			
	KC-130	10	32	0	32			
	EA-6B	167	82	0	82			
	F-111	5	5	0	5			
	F-14	19	127	0	127			
	F-15	191	183	8	191			
	F-16	3	3	0	3			
	F/A-18	23	80	1	81			
	TA-4	3	3	0	3			
	Total	**612**	**550**	**10**	**560**	-9		
VR-1753	A-6	418	0	0	0		51	51
	AV-8B	34	32	2	34			
	C-2	7	7	0	7			
	EA-6B	27	25	2	27			
	F-14	280	749	2	751			
	F-15	144	142	2	144			

Table 6.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 3

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 3 Day 0700-2200	Night 2200-0700	Total	Percent Change	1997 Ldnmr	1999 Ldnmr
	F-16	174	170	4	174			
	F/A-18	8	496	61	557			
	S-3	2	2	0	2			
	Total	1,094	1,623	73	1,696	55		
VR-1754	A-6	134	0	0	0		<50	<50
	CH-53	7	7	0	7			
	EA-6B	69	82	0	82			
	F-14	31	127	0	127			
	F-15	81	75	6	81			
	F-16	3	3	0	3			
	F/A-18	125	80	1	81			
	AV-8B	0	29	1	30			
	KC-130	0	32	0	32			
	Total	450	435	8	443	-2		
VR-1758	A-4	10	10	0	10		56	53
	A-6	448	0	0	0			
	AV-8B	22	29	1	30			
	B-1	7	7	0	7			
	B-52	1	1	0	1			
	EA-6B	139	82	0	82			
	F-14	125	127	0	127			
	F-15	188	184	4	188			
	F-16	8	8	0	8			
	F/A-18	14	80	1	81			

Table 6.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 3

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 3			Percent Change	1997 Ldnmr	1999 Ldnmr
			Day 0700-2200	Night 2200-0700	Total			
	KC-130	0	32	0	32			
	Total	**962**	**560**	**6**	**566**	**-41**		
VR-1759	A-6	114	0	0	0		<50	<50
	AV-8B	17	29	1	30			
	EA-6B	11	82	0	82			
	F-14	27	127	0	127			
	F-15	9	9	0	9			
	F/A-18	3	80	1	81			
	KC-130	0	32	0	32			
	Total	**181**	**359**	**2**	**361**	**99**		
VR-1074	A-6	17	0	0	0		52	51
	AV-8B	196	313	4	317			
	EA-6B	34	34	0	34			
	F-14	8	8	0	8			
	F-15	403	403	0	403			
	F-16	12	12	0	12			
	F/A-18	16	16	0	16			
	Total	**686**	**786**	**4**	**790**	**15**		
IR-0714	A-6	74	0	0	0		<50	<50
	EA-6B	99	17	82	99			
	F/A-18	0	105	9	114			
	Total	**173**	**122**	**91**	**213**	**23**		
Total All MTRs		**7,840**	**8,338**	**239**	**8,577**	**9**	**NA**	**NA**

Source: ATAC 1997; Wyle Labs 1997.

Table 6.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 3

User/Service Category	1997 Sorties Day (0700 - 2200)	1997 Sorties Night (2200 - 0700)	1997 Sorties Total	Projected 1999 Sorties (ARS 3) Day (0700 - 2200)	Projected 1999 Sorties (ARS 3) Night (2200 - 0700)	Projected 1999 Sorties (ARS 3) Total	Percent Change (Total)
TACTS Range							
F-14 (NAS Oceana Fleet)	2,869	47	2,916	1,990	21	2,011	
F-14 (NAS Oceana FRS)	543	0	543	548	0	548	
F/A-18 (NAS Oceana Fleet)	0	0	0	2,286	28	2,314	
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	457	0	457	
F/A-18 (NAS Oceana FRS)	0	0	0	113	0	113	
Adversary Aircraft	612	14	626	1,706	19	1,725	
Air Force Jets	704	11	715	406	23	429	
Total	**4,728**	**72**	**4,800**	**7,506**	**91**	**7,597**	**58**
W-72 (exclusive of TACTS Range)							
F-14 (NAS Oceana Fleet)	2,942	58	3,000	3,723	60	3,783	
F-14 (NAS Oceana FRS)	2,739	0	2,739	2,757	0	2,757	
F/A-18 (NAS Oceana Fleet)	0	0	0	3,680	102	3,782	
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	134	16	150	
F/A-18 (NAS Oceana FRS)	0	0	0	4,522	60	4,582	
F/A-18 (Marine Corps)	75	0	75	75	0	75	
KC-130 (MCAS Cherry Point FRS)	4	0	4	4	0	4	
Adversary Aircraft	121	0	121	491	0	491	
Other Navy Aircraft	2,771	204	2,975	2,764	210	2,974	
Air Force Jets	1,323	0	1,323	1,326	0	1,326	
Other Air Force Aircraft	69	41	110	70	40	110	
Coast Guard Aircraft	46	33	79	46	33	79	
Contractor	876	0	876	875	0	875	
Civilian	34	37	71	34	37	71	
Total	**11,000**	**373**	**11,373**	**20,501**	**558**	**21,059**	**85**
W-386 A/B							
F-14 (NAS Oceana Fleet)	0	0	0	94	0	94	
F-14 (NAS Oceana FRS)	14	0	14	34	0	34	
F/A-18 (NAS Oceana Fleet)	0	0	0	206	4	210	

Table 6.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 3

User/Service Category	1997 Sorties Day (0700 - 2200)	1997 Sorties Night (2200 - 0700)	1997 Sorties Total	Projected 1999 Sorties (ARS 3) Day (0700 - 2200)	Projected 1999 Sorties (ARS 3) Night (2200 - 0700)	Projected 1999 Sorties (ARS 3) Total	Percent Change (Total)
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	0	0	0	
F/A-18 (NAS Oceana FRS)	0	0	0	69	0	69	
F/A-18 (Marine Corps)	15	0	15	15	0	15	
Other Navy Aircraft	360	199	559	362	198	560	
Air Force Jets	3,308	0	3,308	3,518	0	3,518	
Other Air Force Aircraft	75	24	99	75	24	99	
Coast Guard Aircraft	17	2	19	17	2	19	
NASA (missile launches)	183	0	183	183	0	183	
Contractor	7	4	11	7	4	11	
Civilian	129	27	156	130	25	155	
Total	**4,108**	**256**	**4,364**	**4,710**	**257**	**4,967**	**14**
W-386 D							
F-14 (NAS Oceana Fleet)	275	5	280	341	0	341	
F-14 (NAS Oceana FRS)	684	0	684	684	0	684	
F/A-18 (NAS Oceana Fleet)	0	0	0	133	0	133	
Adversary Aircraft	0	0	0	2	0	2	
Air Force Jets	3	0	3	47	0	47	
NASA (missile launches)	183	0	183	183	0	183	
Total	**1,145**	**5**	**1,150**	**1,390**	**0**	**1,390**	**21**
W-122							
F-14 (NAS Oceana Fleet)	718	44	762	553	48	601	
F-14 (NAS Oceana FRS)	123	0	123	112	0	112	
F/A-18 (NAS Oceana Fleet)	0	0	0	328	12	340	
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	1,632	52	1,687	
Adversary Aircraft	0	0	0	72	0	72	
F/A-18 (Marine Corps)	551	68	619	550	72	622	
AV-8 (Cherry Point Fleet)	2,130	32	2,162	2,054	38	2,092	
AV-8 (MCAS Cherry Point FRS)	1,316	0	1,316	1,305	0	1,305	
EA-6B (MCAS Cherry Point Fleet)	1,606	15	1,621	1,610	21	1,631	

Table 6.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS
ARS 3

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 3)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
KC-130 (MCAS Cherry Point Fleet)	144	0	144	143	0	143	
KC-130 (MCAS Cherry Point FRS)	231	0	231	220	0	220	
Other Navy Aircraft	452	184	636	460	177	637	
Air Force Jets	4,852	573	5,425	4,879	542	5,421	
Other Air Force Aircraft	270	60	330	269	61	330	
Coast Guard Aircraft	40	4	44	40	4	44	
Contractor	34	9	43	33	10	43	
Civilian	774	63	837	776	61	837	
Total	**13,241**	**1,052**	**14,293**	**14,371**	**1,050**	**15,421**	**8**

Source: ATAC 1997.

Table 6.2-4

PROJECTED 1999 SORTIES IN THE STUMPY POINT MILITARY OPERATING AREA
ARS 3

User/Service Category	1997 Total	Projected 1999 Operations			Percent Change
		Day (0700-2200)	Night (2200-0700)	Total	
F-14 (NAS Oceana Fleet)	56	20	0	20	-64
F/A-18	0	8	0	8	NA
Total	56	28	0	28	-50

Key:

NAS = Naval Air Station.

Source: ATAC 1997.

6.2.3 Target Ranges

Projected sorties and noise levels in BT-9, BT-11, and the Dare County Range are presented in Table 6.2-6. With the exception of BT-9, which would have a noise level 2 dB higher (i.e., 62 dB in Ldnmr) than ARS 1, no changes in projected noise levels would occur under ARS 3 as compared to ARS 1.

6.2.3.1 BT-9 (Brant Island Shoal)

Projected operations and utilization rates at BT-9 under ARS 3 would be slightly greater than ARS 1. However, projected operations could be readily accommodated within published scheduled hours.

Land Use

The impacts of ARS 3 would be similar to those of ARS 1 (see Section 4.3.1). Projected noise levels would rise from 60 db to 64 dB under this scenario. This range is removed from any development; therefore, there would be no significant noise impacts.

Water Quality

The impacts of ARS 3 would be similar or of a lesser magnitude than those of ARS 1 (see Section 4.3.1).

Table 6.2-5

**PROJECTED 1999 RESTRICTED AREA SORTIES AND NOISE LEVELS
ARS 3**

Restricted Area	Aircraft Type	1997 Sorties	Projected 1999 Sorties - ARS 3			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
			Day	Night	Total			
R-5306A (exclusive of BT-9 and BT-11)	A-10	30	30	0	30		<50	<50
	AH-1	136	136	0	136			
	AV-8B (Fleet)	1,021	1,053	16	1,069			
	AV-8B (FRS)	1,553	1,550	0	1,550			
	EA-6B	288	287	10	297			
	F/A-18 (Marine Corps)	91	91	0	91			
	F-15	56	54	0	54			
	F-16	212	208	4	212			
	F-16 (Air National Guard)	26	26	0	26			
	Other Jet	35	35	0	35			
	Other Prop	90	90	0	90			
	Total	**3,538**	**3,560**	**30**	**3,590**	**1**		
R-5306D	F/A-18	306	307	0	307		54	54
	AV-8B (Fleet)	562	580	0	580			
	KC-130 (Fleet)	22	22	0	22			
	KC-130 (FRS)	34	34	0	34			
	AH-1	165	160	5	165			
	UH-1	305	300	5	305			
	CH-46	3,360	3,255	105	3,360			
	CH-53	1,370	1,300	70	1,370			
	Total	**6,124**	**5,958**	**185**	**6,143**	**<1**		

Sources: ATAC 1997; Wyle Labs 1997.

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Table 6.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS ARS 3

Range	Aircraft Type	1997 Sorties			ARS 3 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 3 Ldnmr (dB)
		Day	Night	Total	Day	Night	Total			
BT-9	A-10	110	0	110	134	0	134		60	64
	AH-1	78	0	78	80	0	80			
	AV-8B (Fleet)	246	6	252	226	12	238			
	AV-8B (FRS)	25	0	25	61	0	61			
	EA-6B	13	0	13	13	0	13			
	CH-46	75	0	75	84	0	84			
	CH-53	9	2	11	15	0	15			
	F-14 (NAS Oceana Fleet)	68	0	68	232	16	248			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	52	0	52	74	8	82			
	F-16	380	8	388	384	0	384			
	F/A-18 (NAS Oceana Fleet)	0	0	0	184	10	194			
	F/A-18 (MCAS Cherry Point Fleet)	0	0	0	84	8	92			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	190	10	200	202	16	218			
	H/UH-1	29	0	29	29	0	29			
	Army Helicopters[a]	74	8	82	82	8	90			
	Other Jet[b]	43	0	43	43	0	43			

Table 6.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 3

Range	Aircraft Type	1997 Sorties			ARS 3 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 3 Ldnmr (dB)
		Day	Night	Total	Day	Night	Total			
	Other Prop[c]	20	0	20	22	0	22			
	Total BT-9	1,679	62	1,741	2,216	106	2,322	33		
BT-11	A-10	120	0	120	102	2	104		68	69
	EA-6B	13	0	13	13	0	13			
	AH-1	107	0	107	105	0	105			
	AV-8B (Fleet)	1,162	36	1,198	1,074	42	1,116			
	AV-8B (FRS)	720	0	720	666	2	668			
	KC-130 (MCAS Cherry Point Fleet)	18	0	18	18	0	18			
	CH-46	123	0	123	114	0	114			
	CH-53	13	2	15	11	0	11			
	F-14 (NAS Oceana Fleet)	494	2	496	686	16	702			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	400	6	406	420	10	430			
	F-16	388	0	388	400	4	404			
	F-16 (Air National Guard)	198	0	198	172	4	176			
	F/A-18 (NAS Oceana Fleet)	0	0	0	974	50	1.024			
	F/A-18 (MCAS Cherry Point Fleet)	0	0	0	380	20	400			
	F/A-18 (Other Navy)	237	28	265	237	28	265			

Table 6.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS ARS 3

Range	Aircraft Type	1997 Sorties			ARS 3 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 3 Ldnmr (dB)
		Day	Night	Total	Day	Night	Total			
	F/A-18 (Marine Corps)	362	22	384	360	16	376			
	H/UH-1	43	0	43	43	0	43			
	Army Helicopters[a]	80	8	88	80	0	80			
	Other Jet[b]	14	3	17	16	1	17			
	Other Prop[c]	17	0	17	15	0	15			
	Total BT-11	4,539	107	4,646	5,916	195	6,111	32		
Dare County Range	A-10	14	0	14	6	0	6		65	65
	AV-8B (Fleet)	68	0	68	62	0	62			
	AV-8B (FRS)	10	0	10	12	0	12			
	EA-6B	5	0	5	5	0	5			
	F-14 (NAS Oceana Fleet)	2,986	38	3,024	2,684	80	2,764			
	F-14 (NAS Oceana FRS)	1,027	0	1,027	998	0	998			
	F-14 (Other Navy)	9	0	9	9	0	9			
	F-15	156	4	160	104	4	108			
	F-16	346	4	350	338	2	340			
	F-16 (Air National Guard)	498	26	524	526	20	546			
	F/A-18 (NAS Oceana Fleet)	0	0	0	1,176	116	1,292			
	F/A-18 (MCAS Cherry Point Fleet)	0	0	0	86	10	96			
	F/A-18 (NAS Oceana FRS)	0	0	0	567	98	665			

Table 6.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS ARS 3

Range	Aircraft Type	1997 Sorties			ARS 3 Sorties			Percent Change	1997 Ldnmr (dB)	ARS 3 Ldnmr (dB)
		Day	Night	Total	Day	Night	Total			
	F/A-18 (Adversary)	12	0	12	30	0	30			
	F/A-18 (Other Navy)	53	0	53	53	0	53			
	F/A-18 (Marine Corps)	26	6	32	20	2	22			
	T-34[d]	0	0	0	26	0	26			
	F-15	1,305	102	1,407	1,305	102	1,407			
	F-16	401	4	405	401	4	405			
	A-10	44	0	44	44	0	44			
	AV-8B	81	0	81	81	0	81			
	EA-6B	1	0	1	1	0	1			
	F-14	63	0	63	63	0	63			
	F/A-18	1	0	1	1	0	1			
	OA-10	7	0	7	7	0	7			
	Total Dare County Range	7,113	184	7,297	8,605	438	9,043	24		

Note: Day is defined as 0700-2200; night is defined as 2200-0700.

[a] Modeled as AH-64.
[b] Modeled as F/A-18.
[c] Modeled as C-130.
[d] Not modeled.

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Aquatic Resources

The impacts of ARS 3 would be similar or of a lesser magnitude than those of ARS 1 (see Section 4.3.1).

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 6.2-7. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 6.2-7. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases are less than 1 ton per year and would not affect air quality in the area.

6.2.3.2 BT-11 (Piney Island)

Projected aircraft operations and utilization rates at BT-11 under ARS 3 would be approximately the same as under ARS 1. Projected operations could be accommodated within published operating hours of the range.

Land Use

Land use impacts under ARS 3 would be similar to those under ARS 1 (see Section 4.3.2).

Water Quality

Impacts under ARS 3 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Aquatic Resources

Impacts under ARS 3 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Terrestrial Resources

Impacts under ARS 3 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Table 6.2-7

PROJECTED EMISSIONS - BT-9 ARS 3

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	17	0.0011	0.0274	0.0033	0.0007	0.0063
F/A-18	31	0.0083	0.0403	0.0207	0.0009	0.0100
AV-8	284	0.0215	0.1596	0.1546	0.0077	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	134	0.0082	0.0212	0.0662	0.0018	0.0095
F-16	23	0.0002	0.0272	0.0028	0.0004	0.0005
F-15	5	0.0001	0.0058	0.0006	0.0001	0.0001
All Helicopters	298	0.1030	0.2475	0.9842	0.0329	0.0000
Other Jets	22	0.0013	0.0005	0.0098	0.0001	0.0010
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**824**	**0.1463**	**0.5328**	**1.2472**	**0.0476**	**0.0274**
Net Change from 1997	**89**	**0.0140**	**0.0647**	**0.1069**	**0.0069**	**0.0084**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all Helicopter operations are below 3,000 ft.

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 6.2-8. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 6.2-8. The net decrease in annual operations below 3,000 feet (914 meters) AGL results in a net decrease in emissions of CO and SO_2. PM_{10}, VOC, and NO_x emissions increase slightly because of an increase in the operations of individual aircraft models which emit most of these pollutants.

6.2.3.3 Dare County Range

Projected aircraft operations and utilization rates at the Dare County Range would be slightly less under ARS 3 than under ARS 1. These operations could be conducted within published operating hours.

Land Use

Land use impacts under ARS 3 would be similar to those under ARS 1 (see Section 4.3.3).

Water Quality

Impacts under ARS 3 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Aquatic Resources

Impacts under ARS 3 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Terrestrial Resources

Impacts under ARS 3 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Table 6.2-8

PROJECTED EMISSIONS - BT-11 ARS 3

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	44	0.0030	0.0721	0.0086	0.0020	0.0166
F/A-18	103	0.0275	0.1328	0.0681	0.0029	0.0329
AV-8	1,695	0.1283	0.9524	0.9226	0.0460	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	104	0.0064	0.0164	0.0514	0.0014	0.0074
F-16	35	0.0004	0.0411	0.0042	0.0006	0.0008
F-15	26	0.0003	0.0305	0.0031	0.0004	0.0006
All Helicopters	353	0.1220	0.2932	1.1658	0.0389	0.0000
Other Jets	12	0.0007	0.0003	0.0053	0.0001	0.0005
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**2,382**	**0.2910**	**1.5419**	**2.2341**	**0.0926**	**0.0588**
Net Change from 1997	**-78**	**0.0013**	**0.0195**	**-0.1025**	**-0.0036**	**0.0263**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all Helicopter operations are below 3,000 ft.
KC-130 operations ignored because aircraft not expected to descent below 3,000 ft. AGL since it is a in-flight refueling aircraft.

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Air Quality

A slightly different mix of aircraft models are used at the Dare County Range compared to BT-9 and BT-11. Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 6.2-9. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 6.2-9. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases are less than 1 ton per year and will not affect air quality in the area.

6.2.4 NAS Oceana and NALF Fentress Land Use

The impacts of construction projects at NAS Oceana under ARS 3 would be similar to those discussed for ARS 1 (see Section 4.4). With regard to the station's AICUZ program, the impacts of ARS 3 would be slightly less than those associated with ARS 1.

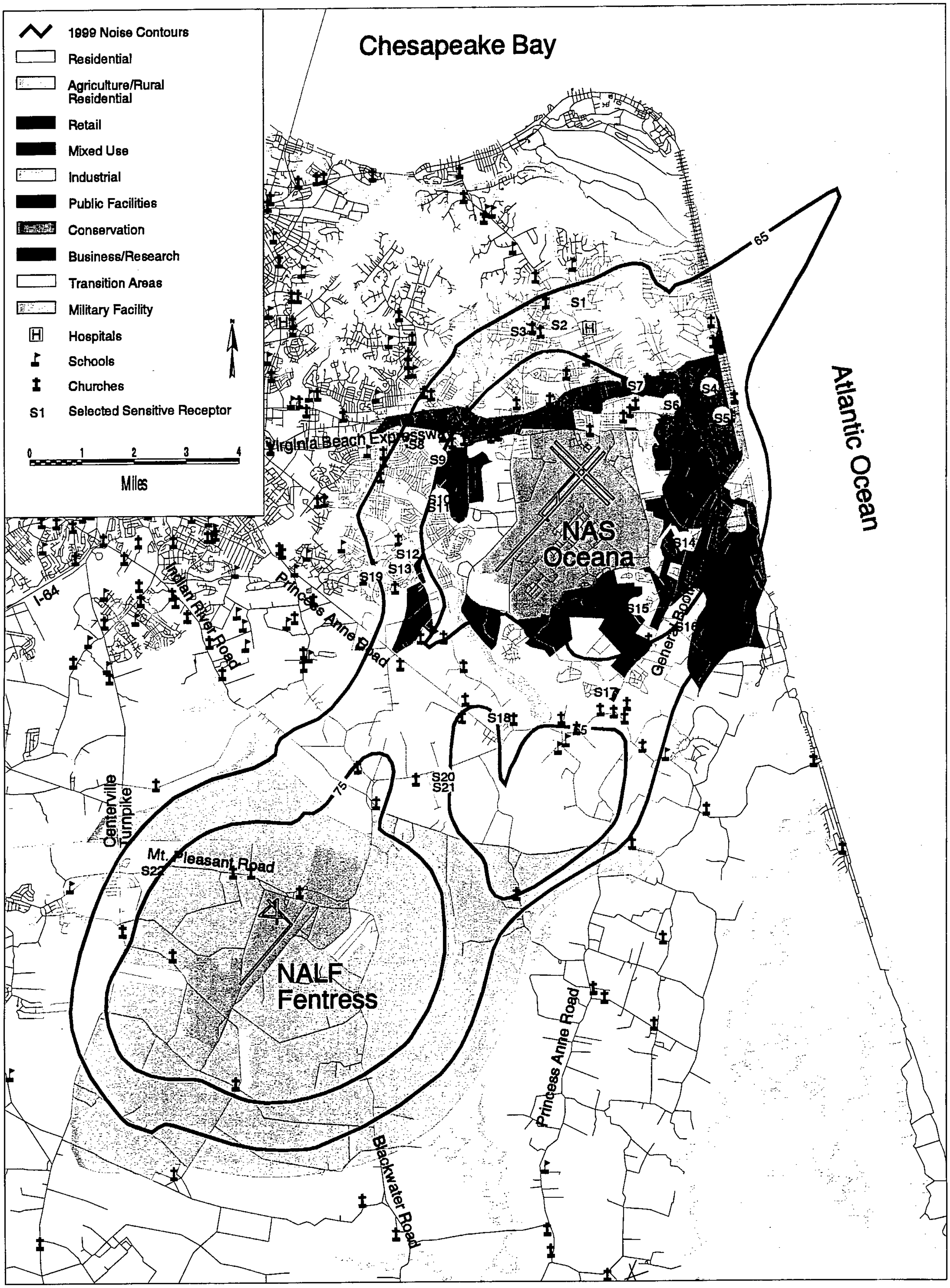
Figure 6.2-1 presents 1999 projected noise contours and land use. Figure 6.2-2 presents the increase between 1978 AICUZ noise contours and projected 1999 noise contours and land use. With regard to APZs under the AICUZ program, the impacts associated with ARS 3 would be the same as those described for ARS 2. Projected APZs under ARS 3 would be identical to ARS 2. The realignment of an additional F/A-18 squadron to MCAS Cherry Point would not significantly reduce the level of operations on any flight tracks at Oceana and, therefore, would not eliminate any of the APZs (see Section 5.2.4).

6.2.5 Socioeconomics and Community Services

6.2.5.1 Population, Employment, Housing, and Taxes/Revenues

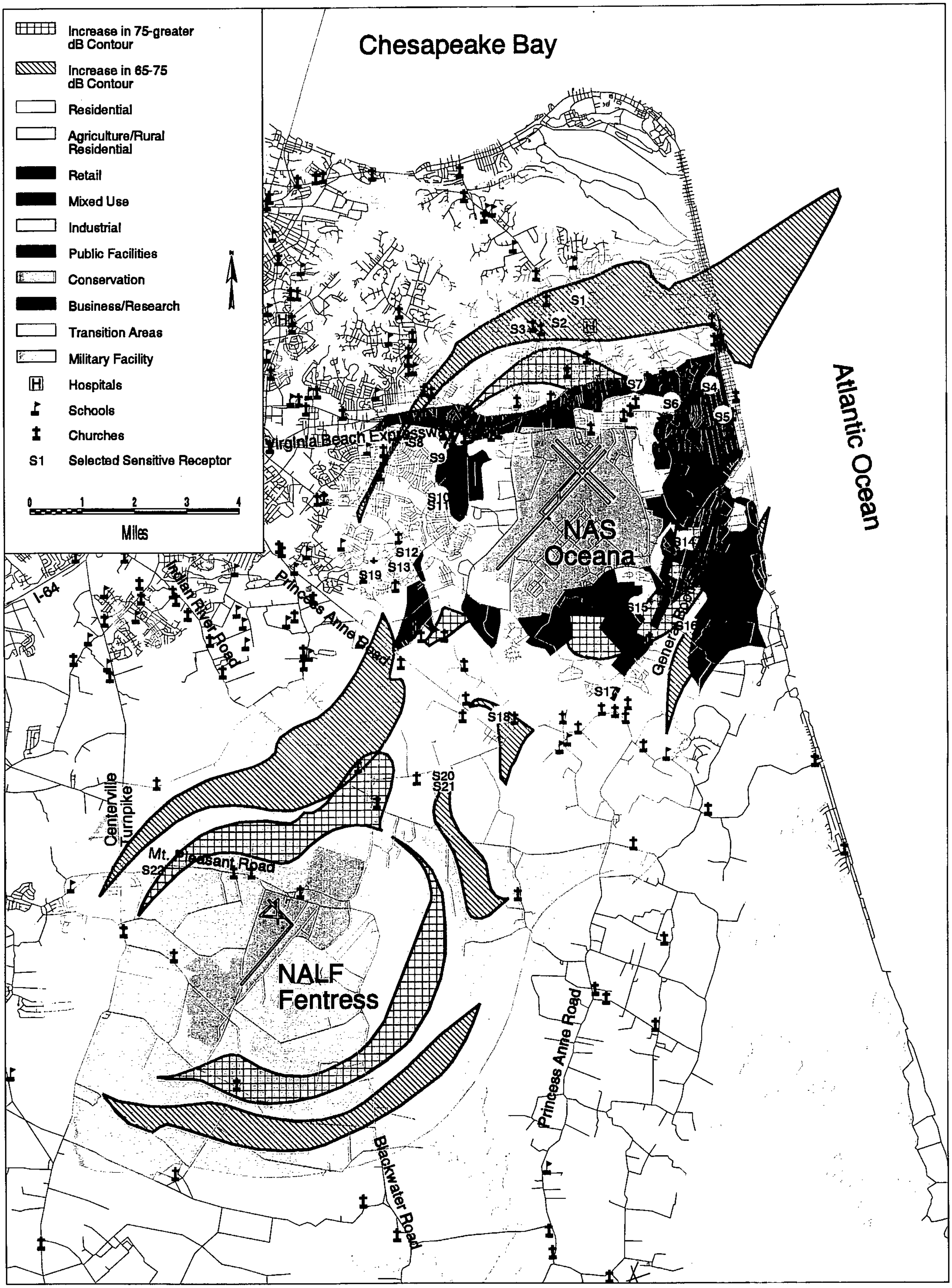
The relocation of eight F/A-18 aircraft squadrons and F/A-18 FRS to NAS Oceana under ARS 3 would result in the transfer of approximately 3,500 personnel (500 officers, 2,900 enlisted personnel, and 100 civilians) to the station.

However, as described in ARS 1 and ARS 2, other personnel movements will have occurred or will be occurring at NAS Oceana during the same time period. Table 6.2-10 details the expected changes in personnel loading figures at NAS Oceana between FY 1996 and FY 1999. This alternative and the other planned and ongoing personnel movements would result in a net increase of 4,900 military and civilian personnel at NAS Oceana over the FY 1996 base population of 8,100 personnel.



Source: Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

Figure 6.2-1
ARS 3 - Projected 1999 Noise Contours and Land Use
NAS Oceana



Source: U.S. Navy 1978; Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

Figure 6.2-2

ARS 3 - Increase between 1978 AICUZ Noise Contours and Projected 1999 Noise Contours and Land Use
NAS Oceana

Table 6.2-9

PROJECTED EMISSIONS - DARE COUNTY RANGE ARS 3

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	226	0.0156	0.3713	0.0445	0.0100	0.0856
F/A-18	108	0.0287	0.1388	0.0711	0.0031	0.0344
AV-8	70	0.0053	0.0395	0.0383	0.0019	0.0000
EA-6B	4	0.0010	0.0012	0.0019	0.0001	0.0000
A-10	6	0.0004	0.0009	0.0030	0.0001	0.0004
F-16	53	0.0006	0.0628	0.0065	0.0009	0.0012
F-15	6	0.0001	0.0077	0.0008	0.0001	0.0001
T-34	2	0.0000	0.0000	0.0001	0.0000	0.0000
Total	**475**	**0.0516**	**0.6222**	**0.1660**	**0.0161**	**0.1217**
Net Change from 1997	**72**	**0.0255**	**0.0979**	**0.0583**	**0.0019**	**0.0256**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.

Table 6.2-10

PROJECTED PERSONNEL LOADING AT NAS OCEANA UNDER ARS 3

	FY 1996	FY 1997	FY 1998	FY 1999
Personnel at beginning of FY	8,100	8,800	9,500	12,580
A-6 Decommissioning	-300	-300	NA	NA
A-6 AIMD and ATKWING Support Staff	NA	-100	NA	NA
Realignment of F-14 FRS Detachment[a]	NA	+150	NA	NA
Realignment of F-14 Squadrons[b]	+600	+600	NA	NA
F-14 Support Staff[b]	+400	+50	NA	NA
Transfer of F-14A Aircraft[c]	NA	+300	NA	NA
Realignment of F/A-18 Squadrons[b]	NA	NA	+1,740	+420
F/A-18 Support Staff			+1,340	
End of Fiscal Year	8,800	9,500	12,580	13,000
Net change from beginning of FY 1996	+700	+1,400	+4,480	+4,900

[a] Result of 1993 BRAC recommendations.
[b] Result of 1995 BRAC recommendations.
[c] Result of action separate from BRAC.

Key:

ATKWING = Attack Wing.
AIMD = Aircraft Intermediate Maintenance Department.
FRS = Fleet Replacement Squadron.
FY = Fiscal Year.
NA = Not applicable.

Source: U.S. Navy 1995a.

Table 6.2-11

NET REGIONAL SOCIOECONOMIC IMPACTS AT NAS OCEANA RESULTING FROM ARS 3[a]

	Virginia Beach	Chesapeake	Norfolk	Portsmouth	Suffolk	Total South Hampton Roads	Other	Total Effects
Population Impacts								
Total military personnel and civilians relocating	3,630	460	290	120	50	4,550	350	4,900
Number of military and civilian dependents	4,490	560	360	150	60	5,620	430	6,050
Total Population Change	**8,120**	**1,020**	**650**	**270**	**110**	**10,170**	**780**	**10,950**
Personnel and Regional Housing Impacts								
Total officers relocating	480	60	40	20	10	610	40	650
Total enlisted personnel relocating	3,080	390	240	100	40	3,850	300	4,150
Total civilians relocating	70	10	10	0	0	90	10	100
Total Military and Civilian Households Relocating	**3,630**	**460**	**290**	**120**	**50**	**4,550**	**350**	**4,900**
Fiscal Impacts								
Total population change	8,120	1,020	650	270	110	10,090	780	NA
Local per capita tax contribution	$1,005	$1,128	$1,048	$883	$842	NA	NA	NA
Estimated Change in Local Tax Contributions	**$8,160,600**	**$1,150,560**	**$681,200**	**$238,410**	**$92,620**	**$10,323,390**	**NA**	**NA**
Education Impacts								
Total elementary school-age children	1,180	150	90	40	10	1,470	110	1,580
Total middle school-age children	360	40	30	10	0	440	30	470
Total high school-age children	230	30	20	10	0	290	20	310
Total Number of School-age Children	**1,770**	**220**	**140**	**60**	**10**	**2,200**	**160**	**2,360**

[a] Includes relocations for ARS 3 and other relocations occurring at NAS Oceana.

Note: Totals may not add up due to rounding.

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Demographic characteristics in the City of Virginia Beach and south Hampton Roads would experience impacts very similar to those described for ARS 1 and ARS 2. When various demographic characteristics of the relocating personnel are taken into account (such as marital status, number of dependents, and household size), the total regional population would increase by approximately 10,950 residents, (military personnel and their dependents). The City of Virginia Beach would receive the largest population impact in the region; total population is expected to expand by approximately 8,120 new residents (or by approximately 2.0% over current population levels) (see Table 6.2-11).

Economy, Employment, and Income

Implementation of ARS 3 would have positive economic impacts on the region similar to those described for the previous alternatives. The largest difference between this scenario and ARS 1 is the amount of money that would be injected into the local economy via military and civilian payroll expenditures. Under ARS 3 annual payroll expenditures would be approximately $198 million while total construction expenditures would be 87.5 million.

Table 6.2-12 summarizes the economic impacts that would occur as a result of the relocation of eight F/A-18 aircraft squadrons and the FRS to NAS Oceana under ARS 3. As shown on the table, the increase in construction expenditures are expected to generate $26.4 million in employee earnings and create approximately 1,100 new jobs in the area.

Table 6.2-12

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF EIGHT F/A-18 AIRCRAFT SQUADRONS AND THE F/A-18 FLEET REPLACEMENT SQUADRON AT NAS OCEANA UNDER ARS 3

Direct Economic Impacts	
Increase in Military and Civilian Payroll	$197,800,000
Construction Expenditures	$87,500,000
Total	$285,300,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$26,400,000
Employment Opportunities (jobs)	1,110

[a] Indirect economic impacts have only been calculated for construction expenditures.

Housing

Impacts to on-station and off-station housing would be almost identical to those described for ARS 2. However, slightly fewer (32) enlisted personnel would reside in NAS Oceana's BEQs under ARS 3 than under ARS 2. Thus, ARS 3 would impact NAS Oceana's BEQs to a slightly lesser extent than ARS 2.

As with ARS 1 and ARS 2, no significant impacts are expected to occur to the BOQ facilities as a result of the proposed realignment. Due to the relatively small number of officers who will be relocating, the ability and preference of most officers to live off-station, and the current vacant spaces in NAS Oceana's BOQs, the existing facilities should have more than enough capacity to house any additional officers who wish to live in these bachelor quarters.

Similar to the impacts discussed for ARS 1 and ARS 2, ARS 3 would have a minor impact on Navy family housing in south Hampton Roads. Assuming a family housing requirement factor of 60% and that 10.5% of these families would choose voluntary separation over relocation, approximately 2,630 families would relocate from NAS Cecil Field to the south Hampton Roads area. However, sufficient family housing is available from the local community. As discussed in the previous ARSs, the total Navy family housing requirement will decline from a total of 49,000 units in 1996 to 45,600 units in 2001 as a net result of downsizing activities and the relocation of 2,600 families from NAS Cecil Field to NAS Oceana. Therefore, the proposed relocation is not expected to significantly impact the supply or price of housing units in the region.

Taxes and Revenues

The fiscal impacts associated with the relocation of eight F/A-18 aircraft squadrons and the FRS to NAS Oceana would be the same as those described in ARS 2. The only difference is that the 8,120 residents living in the City of Virginia Beach would generate approximately $8.2 million in additional tax revenues. Table 6.2-11 presents the estimated change in local tax contributions in each locality in the south Hampton Roads area.

Local government expenditures will also increase as a result of the influx of new residents to the communities. Expenditures on eduction, in particular, will increase. However, as for ARS 1, much of this negative fiscal impact will be offset by the potential increase in federal impact aid, local property tax receipts, and economic activity. No significant negative fiscal impacts to these communities are expected to occur as a result of the proposed realignment.

6.2.5.2 Community Services

The impacts to community services associated with implementation of ARS 3 would be similar to those described in ARS 1 and ARS 2; however, they would be of a lesser magnitude. No significant impacts to community services at or around NAS Oceana would occur as a result of ARS 3.

6.2.6 Infrastructure

6.2.6.1 Water Supply

The impacts of ARS 3 on water supply would be slightly less than those of ARS 1 or ARS 2. ARS 3 would result in a net increase of approximately 4,900 personnel at NAS Oceana by the end of 1999. Using the same consumption rates discussed in Section 4.6.1, this would result in a net increase of 0.216 MGD in on-station water consumption by the end of 1999. As with ARS 1 and ARS 2, no significant impacts to on-station water supply would occur as a result of this increase.

With dependents, the net increase of personnel at NAS Oceana would result in an estimated net increase of 10,170 persons in south Hampton Roads. Based on existing demographic data, approximately 8,120 persons would reside within the City of Virginia Beach and approximately 1,020 would reside within the City of Chesapeake. The remaining persons are expected to be distributed among other local municipalities in the region. Therefore, using daily consumption rates discussed in Section 4.6.1, the daily increase in water consumption in the City of Virginia Beach would be 0.731 MGD by the end of 1999. The daily increase in water consumption in the City of Chesapeake would be 0.070 MGD by the end of 1999.

6.2.6.2 Wastewater System

Impacts to wastewater systems resulting from ARS 3 would be slightly less than those described for ARS 1 (see Section 4.6.2) and for ARS 2. No significant adverse impacts to wastewater systems would occur under ARS 3.

6.2.6.3 Stormwater

Impacts to stormwater systems at NAS Oceana resulting from ARS 3 would be similar to those described for ARS 1 (see Section 4.6.3).

6.2.6.4 Electrical

Impacts to electrical systems at NAS Oceana resulting from ARS 3 would be similar to those described for ARS 1 (see Section 4.6.4).

6.2.6.5 Heating

Impacts to heating systems at NAS Oceana resulting from ARS 3 would be similar to those described for ARS 1 (see Section 4.6.5).

6.2.6.6 Jet Fuel

Impacts to jet fuel facilities at NAS Oceana resulting from ARS 3 would be similar to those described for ARS 1 (see Section 4.6.6).

6.2.6.7 Solid Waste Management

Impacts on solid waste generation at NAS Oceana resulting from ARS 3 would be slightly less than those described for ARS 1 (see Section 4.6.7). No significant adverse impacts to regional landfill facilities would occur under ARS 3.

6.2.7 Transportation

Impacts on roadways in the vicinity of NAS Oceana would be slightly less than those under ARS 1 and ARS 2. Figure 6.2-3 shows projected traffic volumes in the vicinity of the station under ARS 3, and Table 6.2-13 compares projected traffic on these roadways to projected traffic without the proposed realignment.

6.2.7.1 Regional Road Network

As under ARS 1 and ARS 2, Virginia Beach Boulevard between First Colonial and Oceana Boulevard would degrade from LOS C to D. A section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F, which would be considered a significant impact. Some other roadways in the study area would continue to operate at an unacceptable LOS because of overall projected traffic growth in the region. Although ARS 3 would result in additional traffic on these thoroughfares, actual impact on transportation would be, in most cases, negligible because the influx of traffic would be small relative to the existing traffic flows. Approved and planned roadway improvements on currently congested roadways (see Section 3.1.7) and personnel reductions associated with the decommissioning of A-6 squadrons would reduce the impact. Furthermore, planned roadway improvements, specifically the

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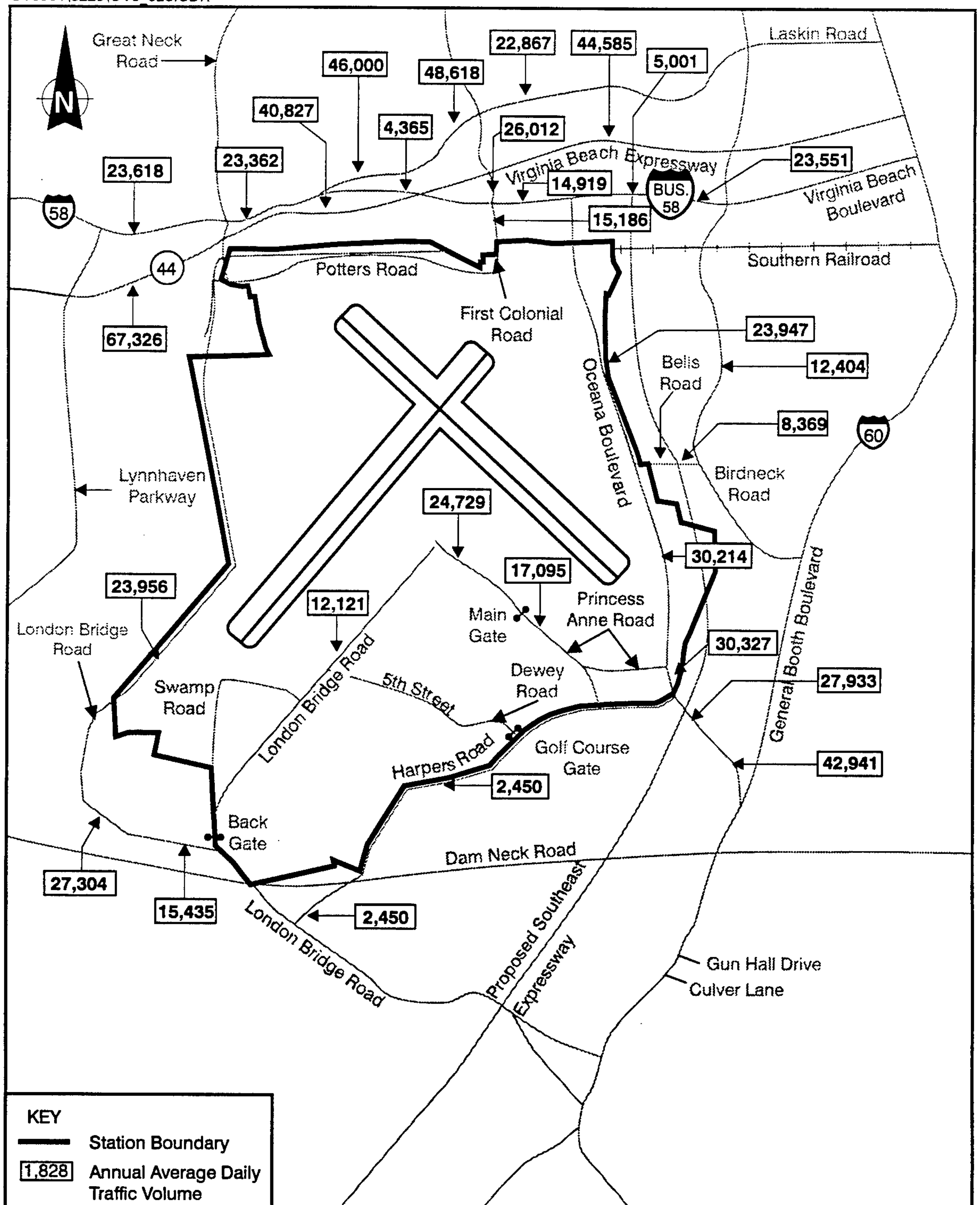


SOURCE: Hampton Roads Planning District Commission 1995c

SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 6.2-3 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING NAS OCEANA FOLLOWING REALIGNMENT UNDER ARS 3

Table 6.2-13

PROJECTED TRAFFIC CONDITIONS UNDER ARS 3 FOLLOWING REALIGNMENT AT NAS OCEANA (Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Princess Anne Road (on base)	21,379	C	24,729	D	3,350
Princess Anne Road (on base) - NASO Main Gate to Oceana Blvd.	13,745	C	17,095	C	3,350
London Bridge Road (on base)	9,591	C	12,121	C	2,530
Harpers Road - Dam Neck to London Bridge	2,295	C	2,450	C	155
Oceana Boulevard - Virginia Beach Blvd. to Bells	23,070	D	23,947	D	877
Oceana Boulevard - Bells to Princess Anne (NASO)	29,017	E	30,214	F	1,197
Oceana Boulevard - Princess Anne (NASO) to Harpers	30,227	F	30,327	F	100
Oceana Boulevard - Harpers to Flicker Way	27,862	F	27,933	F	71
Oceana Boulevard - Flicker Way to General Booth	42,876	F	42,941	F	65
First Colonial Road - Base Boundary to Indiana Avenue	1,737	C	1,741	C	4
First Colonial - Indiana to Virginia Beach Blvd.	14,788	C	15,186	C	398
First Colonial - Virginia Beach Boulevard to Expressway	25,808	D	26,012	D	204
London Bridge Road - Swamp Rd. to Shipps Corner	15,184	F	15,435	F	251
London Bridge Road - Shipps Corner to Crusader Circle	27,284	F	27,304	F	20
London Bridge Road - Crusader Circle to International Parkway	23,949	F	23,956	F	7

Key at end of table.

Table 6.2-13

PROJECTED TRAFFIC CONDITIONS UNDER ARS 3
FOLLOWING REALIGNMENT AT NAS OCEANA
(Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Virginia Beach Blvd. - Lynnhaven to Great Neck Road	23,560	B	23,618	B	58
Virginia Beach Blvd. - London Bridge Rd. to Chapel Lake	22,961	B	23,362	B	401
Virginia Beach Blvd. - Chapel Lake to Fountain Dr.	3,826	B	4,365	B	539
Virginia Beach Blvd. - Fountain Dr. to First Colonial	4,307	B	5,530	B	1,223
Virginia Beach Blvd. - First Colonial to Oceana	13,306	C	14,919	D	1,613
Virginia Beach Blvd. - Oceana to Shipps Ln.	3,828	B	5,001	B	1,173
Virginia Beach Blvd. - Shipps Ln. to Birdneck	22,970	B	23,551	B	581
Virginia Beach/Norfolk Expressway (SR 44) - Lynnhaven to Great Neck	66,882	C	67,326	C	444
Virginia Beach/Norfolk Expressway (SR44) - Great Neck to First Colonial	40,383	B	40,827	B	444
VA Beach/Norfolk Expressway (SR44) - First Colonial to Birdneck	44,253	B	44,585	B	332
Laskin Road - Great Neck to Victor Cr.	45,927	F	46,000	F	73
Laskin Road - Victor Cr. to First Colonial	48,234	F	48,618	F	384
Laskin Road - First Colonial to Birdneck Rd.	22,649	B	22,867	B	218
Bells Road - Birdneck to Oceana Blvd.	7,963	C	8,369	C	406
Birdneck Road - General Booth to Bells	8,274	C	8,473	C	199

Key at end of table.

Table 6.2-13

PROJECTED TRAFFIC CONDITIONS UNDER ARS 3
FOLLOWING REALIGNMENT AT NAS OCEANA
(Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Birdneck Road - Bells to Owl's Creek	12,205	D	12,404	D	199

Note: LOS based on Generalized Annual Average Daily Volumes for Area's Transitioning into urbanized areas as established in Level of Service Standards and Guidelines Manual for Planning (Florida Department of Transportation 1992).

Key:

A = Free-flow conditions.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds; however, low maneuverability.
E = Traffic at capacity of segment; unstable flows with little or no maneuverability.
F = Forced-flow conditions characterized by periodic stop-and-go conditions and no maneuverability.

Sources: HRPDC 1995c.

expansion of Oceana Boulevard, would provide additional capacity on the regional transportation network.

6.2.7.2 Station Road Network

As under the other ARSs the most significant increases in traffic volume under ARS 3 would be on station roadways. In turn, intersections at the station would experience a similar degradation in LOS as under ARS 1.

6.2.7.3 Planned Road Improvements

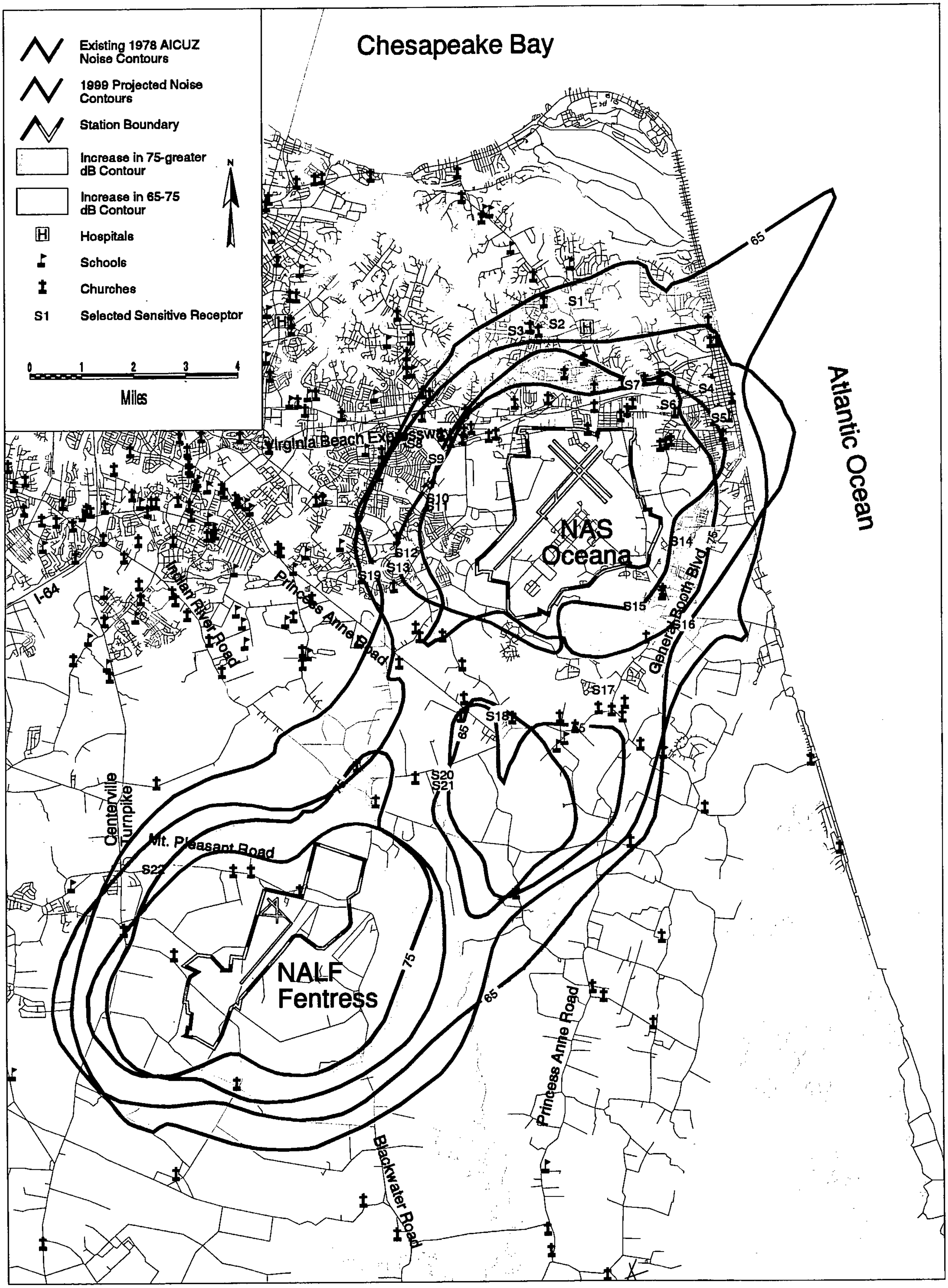
As under ARS 1 and ARS 2, traffic projected under ARS 3 would not significantly affect the feasibility of any proposed road improvements in the region.

6.2.8 Noise

Long-term increases in noise levels around NAS Oceana would occur as a result of increased aircraft operations associated with ARS 3; however, they would be slightly less than those associated with ARS 1 or ARS 2 (Wyle Labs 1997). Figure 6.2-4 depicts projected 1999 AAD noise contours compared to existing 1978 AICUZ contours.

Table 6.2-14 compares the estimated area and population within the 1978 AICUZ contours and existing 1997 noise contours to projected 1999 noise contours under ARS 3. The projected 65 to 75 dB noise contour for ARS 3 would cover an area of 32,274 acres (13,061 hectares), with an estimated population of 76,605 people. The 75 dB or greater contour would cover an area of 26,299 acres (10,643 hectares), with an estimated population of 47,113 (Wyle Labs 1997). Areas not previously exposed to an Ldn of 65 to 75 dB would total 10,824 acres (4,380 hectares) and contain an estimated 17,928 people. Areas not previously exposed to an Ldn of 75 dB or greater would total 7,106 acres (2,876 hectares) and contain an estimated 13,661 people. As in ARS 1 and ARS 2, selected areas in the vicinity of NAS Oceana would experience a decrease in noise levels due to existing aircraft flight tracks and runway utilization (see Table 6.2-15). Approximately 13,590 people would realize reduced noise levels, including an estimated 10,167 who would experience a decrease in high noise levels (greater than 75 Ldn).

Table 6.2-16 presents the projected site-specific Ldn at schools located within the 65 dB or greater Ldn contour. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions (Wyle Labs 1997). Schools are considered compatible with outside noise levels between 65 and 75 Ldn only if they have sufficient sound



Source: U.S. Navy 1978, Wyle Labs 1997

Figure 6.2-4

ARS 3 - Comparison of 1978 and Projected 1999 Average Annual Day Noise Contours NAS Oceana

Table 6.2-14

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1978 AICUZ, EXISTING 1997, AND PROJECTED 1999 NOISE CONTOURS NAS OCEANA/NALF FENTRESS - ARS 3

Ldn	1978 AICUZ		1997 Noise Contours		1999 Noise Contours		New Area/Population Exposed Relative to 1978 AICUZ[a]	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	31,214 (12,632)	66,123	13,293 (5,379)	33,545	32,274 (13,061)	76,605	10,824 (4,380)	17,928
75 dB or greater	20,361 (8,240)	42,445	4,949 (2,002)	1,295	26,299 (10,643)	47,113	7,106 (3,129)	13,661
Total	51,575 (20,872)	108,568	18,242 (7,382)	34,840	58,573 (23,704)	123,718	17,930 (7,509)	31,589

Note: Numbers exclude water areas.

[a] Represents only new area/population that previously were not exposed to listed noise levels under 1978 AICUZ. Does not equal the difference between 1978 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.

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Table 6.2-15 DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE RELATIVE TO AICUZ NAS OCEANA/NALF FENTRESS ARS 3		
Reduction in Ldn	**Area in Acres (Hectares)**	**Estimated Population**
75+ to 65 - 75 dB	-1,795 (-727)	-10,167
65 - 75 to <65 dB	-4,200 (-1,700)	-3,423
Total	-5,995 (-2,427)	-13,590

Note: Numbers exclude water areas.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Table 6.2-16

SCHOOLS LOCATED WITHIN
1999 PROJECTED CONTOURS GREATER THAN 65 Ldn
NAS OCEANA/NALF FENTRESS - ARS 3

Identification Number[a]/Name	1997 Ldn (dB)	1999 Ldn (dB)	1999 Leq (dB)
S1 First Colonial High	59	68	67
S2 Lynnhaven Middle	61	71	69
S3 Trantwood Elementary	56	68	66
S4 Virginia Beach Middle	57	70	68
S5 Cooke Elementary	57	70	66
S6 Seatack Elementary[b]	63	77	74
S7 Linkhorn Elementary[b]	62	75	73
S8 Lynnhaven Elementary	55	69	65
S9 Plaza Middle	60	74	70
S10 Brookwood Elementary	66	78	74
S11 Plaza Elementary	67	78	75
S12 Holland Elementary	66	71	69
S13 Green Run Elementary	62	69	67
S14 Birdneck Elementary	67	83	75
S15 Corporate Landing Elementary & Middle	63	78	72
S16 Ocean Lake Elementary	57	73	66
S17 Strawbridge Elementary	58	69	66
S18 Kellam High	56	65	62
S19 Rosemont Elementary	59	65	63
S20 Princess Anne Elementary	52	66	62
S21 Princess Anne Middle	52	66	62
S22 Butts Road Intermediate	52	72	64

[a] Schools are shown on Figure 6.2-4.
[b] Seatack and Linkhorn elementary schools are being relocated.

Key:

dB = Decibel.
Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

attenuation to reduce interior noise levels to approximately 45 dB. To analyze potential noise impacts to schools, the school-day (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) Leq was calculated for 1999 conditions for those schools expected to be within the 65 dB or greater Ldn (see Table 6.2-16). Use of central air conditioning systems in association with closed windows normally reduces noise levels by approximately 25 dB. Therefore, school sites with a 1999 exterior Leq of 70 dB or less would likely experience minimal interference. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at those schools of particular concern.

The maximum sound levels of typical F/A-18 events similar to those conducted at NAS Oceana and NALF Fentress are shown in Table 6.2-17. Levels for F-14s are presented for comparative purposes. The anticipated number of average daily operations by event is also presented in Table 6.2-18.

Table 6.2-17

MAXIMUM SOUND LEVELS AT RECEPTOR WITH AIRCRAFT AT 1,000 FEET AGL (decibels)

	F/A-18	F-14A	F14B/D
Departures	108	97	96
Arrivals	104	83	88
Touch-and-Go	97	87	91
FCLP			
Oceana	97	87	91
Fentress[a]	98	90	93

[a] 800 Feet AGL.

The noise contours presented in Figure 6.2-4 are based on current operating procedures and flight patterns at NAS Oceana. The station continually evaluates noise mitigation options to reduce the noise impacts on the local community. These include an evaluation of:

- Arrival and departure procedures;
- Airfield hours of operation;

Table 6.2-18 PROJECTED AVERAGE DAY OPERATIONS FOR SELECTED F/A-18 EVENTS		
	NAS Oceana	NALF Fentress
Departures	54	8
Arrivals	54	8
Touch- and-Go[a]	84	0
FCLP[a]	2	52

a Touch-and-go and FCLP sorties equal two operations each.

- Pattern altitudes;
- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

NAS Oceana would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation. These options are discussed in Section 4.8.

6.2.9 Air Quality

6.2.9.1 Air Quality Regulations

The air quality regulations and conformity issue discussion presented in Section 4.9.1 are also applicable to ARS 3.

6.2.9.2 General Conformity Rule

The General Conformity Rule discussion presented in Section 4.9.2 is also applicable to ARS 3.

6.2.9.3 Projected Emissions at NAS Oceana

Projected emissions for ARS 3 are presented in Table 6.2-19. The categories of sources in ARS 3 are identical to those in ARS 1. A smaller number of F/A-18 aircraft based at NAS Oceana in 1999 is the only change affecting emissions. The reduced number of aircraft lowers the total emissions projected for NAS Oceana in the categories of aircraft, in-frame maintenance run-ups, and engine testing in test cells. As under ARS 2 (see Section

Table 6.2-19
AIR EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 3
(tons per year)

	1993					1996					1997				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:															
Mobile Sources:															
Aircraft Operations	272.13	328.88	609.85	18.59	152.58	122.22	222.92	292.03	10.73	120.83	149.41	287.13	357.52	13.77	155.59
Total Aircraft:	**272.13**	**328.88**	**609.85**	**18.59**	**152.58**	**122.22**	**222.92**	**292.03**	**10.73**	**120.83**	**149.41**	**287.13**	**357.52**	**13.77**	**155.59**
Other Mobile Sources:															
GSE	5.13	26.43	72.65	1.71	2.00	0.00	0.00	0.00	0.00	0.00	4.57	34.01	18.73	2.20	2.66
Maintenance Run-ups	70.29	177.95	130.69	5.82	47.42	29.40	136.41	61.78	3.90	47.42	38.29	198.30	97.19	5.86	72.28
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile:	**75.97**	**211.27**	**204.82**	**7.98**	**49.90**	**29.96**	**143.30**	**63.26**	**4.35**	**47.90**	**43.42**	**239.20**	**117.40**	**8.51**	**75.42**
Stationary Sources:															
Boilers:	1.13	32.32	8.31	22.09	3.84	0.78	29.13	7.52	23.76	3.63	0.78	29.13	7.52	23.76	3.63
Generators	0.71	8.67	1.87	0.57	0.61	0.71	8.67	1.87	0.57	0.61	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	6.24	37.65	49.39	1.80	4.32	3.94	28.46	39.07	1.31	3.95	5.05	37.01	50.83	1.71	4.62
JP-5 Fuel Handling	0.66	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
Service Station	19.35	0.00	0.00	0.00	0.00	4.46	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00
Painting	19.30	0.00	0.00	0.00	0.00	13.29	0.00	0.00	0.00	0.00	24.05	0.00	0.00	0.00	0.00
Construction:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary:	**47.39**	**78.64**	**59.57**	**24.46**	**8.77**	**23.64**	**66.26**	**48.46**	**25.64**	**8.19**	**37.20**	**94.01**	**65.62**	**29.24**	**10.46**
Total NASO:	**395.49**	**618.78**	**874.24**	**51.04**	**211.24**	**175.82**	**432.48**	**403.74**	**40.71**	**176.92**	**230.03**	**620.34**	**540.54**	**51.52**	**241.47**
NALF Fentress:															
Aircraft	13.48	146.63	37.00	6.81	30.87	11.86	157.08	25.30	6.47	42.82	13.77	191.22	29.55	7.64	56.05
Total Annual:	**408.97**	**765.41**	**911.24**	**57.85**	**242.11**	**187.68**	**589.56**	**429.04**	**47.19**	**219.73**	**243.80**	**811.56**	**570.09**	**59.16**	**297.52**

Table 6.2-19
AIR EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 3
(tons per year)

	1998					1999				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:										
Mobile Sources:										
Aircraft Operations	302.12	436.54	797.59	19.57	235.03	333.68	467.38	887.82	20.80	251.55
Total Aircraft:	**302.12**	**436.54**	**797.59**	**19.57**	**235.03**	**333.68**	**467.38**	**887.82**	**20.80**	**251.55**
Other Mobile Sources:										
GSE	0.10	1.21	0.26	0.08	0.08	0.00	0.00	0.00	0.00	0.00
Maintenance Run-ups	54.34	225.33	140.54	3.46	84.44	56.57	229.55	146.69	6.75	86.27
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile:	**55.00**	**233.42**	**142.28**	**3.99**	**85.00**	**57.13**	**236.44**	**148.17**	**7.20**	**86.75**
Stationary Sources:										
Boilers:	0.62	27.13	6.68	22.82	3.38	0.62	27.13	6.68	22.82	3.38
Generators	2.11	27.87	7.27	3.77	2.21	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	9.12	48.76	64.06	1.99	9.23	9.95	51.20	66.88	2.05	10.08
JP-5 Fuel Handling	0.81	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
Service Station	6.40	0.00	0.00	0.00	0.00	6.72	0.00	0.00	0.00	0.00
Painting	34.12	0.00	0.00	0.00	0.00	34.16	0.00	0.00	0.00	0.00
Construction:	2.42	24.74	7.75	2.28	3.65	0.00	0.00	0.00	0.00	0.00
Total Stationary:	**55.60**	**128.50**	**85.76**	**30.86**	**18.47**	**54.46**	**106.20**	**80.83**	**28.64**	**15.67**
Total NASO:	**412.72**	**798.47**	**1,025.63**	**54.43**	**338.50**	**445.27**	**810.02**	**1,116.82**	**56.65**	**353.97**
NALF Fentress:										
Aircraft	15.33	244.11	36.18	9.33	78.68	15.67	254.22	37.50	9.66	83.08
Total Annual:	**428.05**	**1,042.58**	**1,061.81**	**63.76**	**417.18**	**460.94**	**1,064.25**	**1,154.33**	**66.31**	**437.05**

Note: Shaded areas indicate nonattainment pollutants of concern.

Key: VOC = volatile organic compounds. SO2 = sulfur dioxide.
NOx = oxides of nitrogen. PM10 = particulate matter. JP-5 = jet fuel.
CO = carbon monoxide. GSE = Ground Support Equipment

5.2.9), other sources listed in Table 6.2-19 would not be altered by the smaller F/A-18 population associated with ARS 3.

The estimated nonattainment precursor emissions for aircraft flight operations at NAS Oceana in 1999 are 334 tons per year of VOC and 467 tons per year of NO_X. Attainment pollutant emissions are 888 tons per year of CO, 21 tons per year of SO_2, and 252 tons per year of PM_{10}. Total nonattainment precursor emissions for other mobile sources are 57 tons per year of VOC and 236 tons per year of NO_X. Attainment pollutant emissions are 148 tons per year of CO, 7 tons per year of SO_2, and 87 tons per year of PM_{10}.

The estimated nonattainment ozone precursor emissions for stationary sources in 1999 are 54 tons per year of VOC and 106 tons per year of NO_x. Attainment pollutant emissions are 81 tons per year of CO, tons per year of SO_2, and 16 tons per year of PM_{10}.

6.2.9.4 Projected Emissions at NALF Fentress

This facility is used in the same manner under ARS 3 as under ARS 1, although fewer F/A-18 aircraft operations occur under ARS 3. The projected emissions for aircraft operations are summarized by year in Table 6.2-19. In 1999, nonattainment precursor emissions (VOC and NO_x) from these operations are 16 and 254 tons per year, respectively. Attainment pollutant emissions total 38 tons per year of CO, 10 tons per year of SO_2, and 83 tons per year of PM_{10}.

6.2.9.5 Total Net Projected Emissions

Table 6.2-20 presents the summary of net projected emissions from NAS Oceana and NALF Fentress for 1993 and 1996 through 1999 for ARS 3. The net change in emissions for ARS 3 would be 52 tons per year of VOCs, 299 tons per year of NO_x, 243 tons per year of CO, 8 tons per year of SO_2, and 195 tons per year of PM_{10}. ARS 3 reduces net air emissions by 53 tons per year for VOCs and 97 tons per year for NO_x compared to ARS 1.

6.2.10 Topography, Geology, and Soils

The impacts of ARS 3 at NAS Oceana would be the same as discussed for ARS 1 (see Section 4.10).

6.2.11 Water Resources

The impacts of ARS 3 at NAS Oceana would be the same as discussed for ARS 1 (see Section 4.11).

Table 6.2-20
NET EMISSIONS CHANGE - NAS OCEANA AND NALF FENTRESS - ARS 3
(tons per year)

Year	VOCs	NOx	CO	SO2	PM10
NAS Oceana:					
1993	395.49	618.78	874.24	51.04	211.24
1996	175.82	432.48	403.74	40.71	176.92
1997	230.03	620.34	540.54	51.52	241.47
1998	412.72	798.47	1025.63	54.43	338.50
1999	445.27	810.02	1116.82	56.65	353.97
Net Change:					
1993 to 1999	**49.78**	**191.24**	**242.58**	**5.61**	**142.73**
NALF Fentress:					
1993	13.48	146.63	37.00	6.81	30.87
1996	11.86	157.08	25.30	6.47	42.82
1997	13.77	191.22	29.55	7.64	56.05
1998	15.33	244.11	36.18	9.33	78.68
1999	15.67	254.22	37.50	9.66	83.08
Net Change:					
1993 to 1999	**2.19**	**107.59**	**0.50**	**2.86**	**52.21**
Net Change NAS Oceana and NALF Fentress:					
1993 to 1999	**51.97**	**298.83**	**243.09**	**8.47**	**194.94**

Note: Shaded areas indicate nonattainment pollutants of concern.

Key:

VOC = volatile organic compounds
NOx = oxides of nitrogen
CO = carbon monoxide
SO2 = sulfur dioxide
PM10 = particulate matter

6.2.12 Terrestrial Environment

The impacts of ARS 3 at NAS Oceana would be the same as discussed for ARS 1 (see Section 4.12).

6.2.13 Cultural Resources

The impacts of ARS 3 at NAS Oceana would be the same as discussed for ARS 1 (see Section 4.13).

6.2.14 Environmental Contamination

The impacts of ARS 3 at NAS Oceana would be the same as discussed for ARS 1 (see Section 4.14) except for the amount of hazardous waste generated. The increase in hazardous waste is estimated to be 45,600 lbs. (20,684 kilograms), or 33% above 1995 levels. It is expected that this increase can be accommodated by existing station resources.

7 Environmental Consequences and Mitigation Measures: Alternative Realignment Scenario 4

ARS 4 would involve realigning five F/A-18 fleet squadrons to MCAS Beaufort, with the remaining six F/A-18 fleet squadrons and the F/A-18 FRS being realigned to NAS Oceana. Therefore, this section discusses potential impacts at MCAS Beaufort and NAS Oceana. Where appropriate, mitigation measures to avoid or lessen the severity of projected impacts are discussed.

7.1 Environmental Consequences and Mitigation Measures: ARS 4 at MCAS Beaufort

7.1.1 Airfield Operations

The projected F/A-18 operations under ARS 4 would greatly increase the number of airfield operations that would occur at MCAS Beaufort. Projected F/A-18 operations were calculated as part of the noise impact analysis conducted at the station (Wyle Labs 1997).

Table 7.1-1 presents projected F/A-18 operations at MCAS Beaufort under ARS 4. Total operations would increase from 1997 levels, growing from 38,000 to over 70,000 total operations. This would represent an 84% increase over 1997 levels (Wyle Labs 1997).

Based upon the fact that ARS 4 includes the construction of a new parallel runway at MCAS Beaufort, F/A-18 aircraft that would be realigned under ARS 4 could complete their required number of operations without significantly affecting overall airfield operations at the station. Unusually long taxi times, fuel pit delays, or denials of access to certain patterns would not occur at the station as result of ARS 4 (Wyle Labs 1997).

7.1.2 Military Training Areas

7.1.2.1 Military Training Routes

MTRs in the vicinity of MCAS Beaufort (i.e., VR-1004, VR-97, VR-1040, and IR-18) would not be significantly affected by the implementation of ARS 4. Based upon projected MTR usage rates for ARS 4 and ARS 5, the potential MTR usage in the vicinity of MCAS Beaufort is estimated at 300 total annual sorties (ATAC 1997). No individual MTR use would increase significantly over existing levels and no significant noise increases would occur under the routes.

7.1.2.2 Warning Areas

Five F/A-18 squadrons would be transferred to MCAS Beaufort under ARS 4. These aircraft would train with Marine Corps aircraft at the station. Therefore, there would be an increase in utilization rates for warning areas around MCAS Beaufort; however, there would be no significant impact associated with this increase.

7.1.2.3 Military Operating Areas

No significant increase in aircraft operations would occur as a result of aircraft being transferred to MCAS Beaufort under ARS 4.

Table 7.1-1

**1997 AND PROPOSED 1999 F/A-18 OPERATIONS UNDER ARS 4
MCAS BEAUFORT**

Activity Description	Day 0700-2200		Night 2200-0700		Total Operations	
	Existing	ARS 4	Existing	ARS 4	Existing	ARS 4
Departures	10,587	15,353	93	234	10,680	15,587
Full Stop Arrivals	5,541	6,399	227	583	5,768	6,982
Overhead and Carrier Break Arrivals	4,871	8,444	41	161	4,912	8,605
Touch-and-Go Operations/Low Approaches	4,546	13,223	160	1,056	4,706	14,279
Field Carrier Landing Practice	9,805	20,297	2,088	4,909	11,893	25,206
GCA Box	28	140	0	0	28	140
Total	35,378	63,856	2,609	6,943	37,987	70,799

Source: Wyle Labs 1997.

7.1.3 Target Ranges

The implementation of ARS 4 would result in an increase in the use of the Townsend Bombing Range by Navy F/A-18 aircraft. Based upon the difference between ARS 5 and ARS 4 projected usage rates for the Dare County Range, BT-9, and BT-11 in North Carolina (ATAC 1997), it is estimated that approximately 1,200 total annual sorties would be conducted at the Townsend Bombing Range by Navy F/A-18 aircraft under ARS 4. Approximately 97% of these (1,164 sorties) would be conducted during daytime hours, with the balance (36 sorties) conducted during nighttime hours. Atlantic Fleet F/A-18s, now at NAS Cecil Field, currently use this range for training. These additional sorties would not significantly affect the efficiency of the range's operations. Projected usage of the Townsend Bombing Range is estimated at 4,000 sorties (Georgia Air National Guard 1995). The increase of approximately 1,200 F/A-18 sorties would not significantly affect noise levels in the vicinity of the range.

Given the limited number of projected sorties by Navy F/A-18 aircraft associated with ARS 4, no significant impacts would occur to land use, water quality, or terrestrial resources at the range. Navy F/A-18 aircraft would use existing flight tracks and range targets as its Marine Corps counterparts at MCAS Beaufort; therefore, no significant changes from current conditions would occur as a result of ARS 4.

7.1.4 MCAS Beaufort Land Use

7.1.4.1 Projected Land Use

To support the realignment of five F/A-18 squadrons to MCAS Beaufort under ARS 4 several construction projects would be required. For the most part, these actions would result in long-term land use changes at the station, primarily occurring in the core (i.e., developed) area of the station. The majority of these projects would be consistent with surrounding land uses. However, the construction of a new parallel runway required under ARS 4 would result in major conflicts with existing uses. In order to implement this project, a large-scale program of demolition would need to occur, to remove buildings and structures that would be located in the primary surface and clear zones for the runway. Such facilities would include various ordnance storage and handling facilities.

7.1.4.2 Plans and Policies

The majority of proposed land use changes at MCAS Beaufort resulting from construction under ARS 4 would be consistent with proposed land use classifications outlined in the

station's Master Plan. Proposed projects that would be inconsistent with the Master Plan include the AIMD facility and the administration building. Project description, location, and proposed land use classifications are discussed below.

- The three-module hangar and associated parking apron/taxiway/ aircraft refueling system would be located on the northeast side of Runway 32, south of Quilali Road. The proposed use would be consistent with the Master Plan designation of this area as "operations." The three-module hangar and associated parking apron/ taxiway/aircraft refueling system would impact 26 acres (10.5 hectares).

- The hangar renovations/addition would be located south of the cross runway configuration, and would be consistent with the Master Plan designation of this area as "operations."

- The flight simulator training facility would be located along Drayton Street south of the cross runway configuration, and would be consistent with the Master Plan designation of this area as "training". This training facility would impact 0.9 acre (0.4 hectare).

- The MF Pad would be located along Drayton Street south of the cross runway configuration, and would be consistent with the Master Plan designation of this area as "operations". The MF Pad would impact 8.9 acres (3.6 hectares).

- The administrative building would be located along Elrod Street and would be inconsistent with the Master Plan designation as "operations." However, the administrative functions would not significantly impair the intent of the plan for this area of the station. The administrative building would impact 0.4 acre (0.1 hectare).

- The AIMD would be located in the center core area near the intersection of Elrod Street and Longstaff Avenue, and would be inconsistent with the Master Plan designation of this area as "station support (security, etc.)". However, the operational characteristics of the proposed AIMD facility would not significantly impair the intent of the plan for this area of the station. The AIMD would impact 2.1 acres (0.8 hectare).

- The CALA Pad would be accessed by Funa Futi Road E., north of the cross runway configuration, and would be consistent with the Master Plan designation of this area as "ordnance storage". The CALA pad would impact 12.4 acres (5.0 hectares).

- The proposed runway would parallel Runways 5 and 23 to the northwest. The Master Plan designates land uses within the runway corridor for developmentally constrained space, ordnance, training, and operations. The runway would impact 55.5 acres (22.5 hectares).

- BEQ (P-411) would be located in the southeast part of the core area near the intersection of Geiger Boulevard and Kavieng Street and would be consistent with the Master Plan designation of this area as "troop housing". This BEQ would be Phase III of a four-phase plan for additional troop housing. The BEQ would impact 2.1 acres (0.9 hectare).

- The child development center would be located in the south-central core area along Geiger Boulevard, and would be consistent with the Master Plan designation of this area as "community facilities". The child center would impact 0.2 acre (0.1 hectare).

- The missile magazines would be located along Funa Futi Road W., north of the cross runway configuration, and would be consistent with the Master Plan designation of this area as "ordnance storage." The missile magazines would impact 0.3 acre (0.1 hectare) each.

- BEQ (P-412) would be located south of BEQ (P-411) in the southeast part of the core area at the intersection of Delalio Avenue and LaFrene Road. The proposed BEQ would be consistent with a proposed Master Plan amendment designating this area for "troop housing." This would be Phase IV of a four-phase plan for additional troop housing. The BEQ would impact 1.9 acres (0.8 hectare).

- The flight line medical clinic would be located in the northeast quadrant of the station, although its exact location has not been determined yet.

- The family housing would be located in the northern section of the Laurel Bay Family Housing Area and would be consistent with the Master Plan designation of this area as "family housing." Currently, the Navy is evaluating plans for 280 or more family housing units in an area of 121 acres (49 hectares). The 240 additional housing units proposed under this ARS would be located on approximately 6.6 acres (2.7 hectares) of the designated 121-acre (49-hectare) site.

With the exception of the proposed runway, these actions would not result in any significant long-term land use disturbances or changes at the station. Minor land use inconsistencies between the Master Plan and several of the proposed facilities (AIMD facility, BEQ, and administration building) are not significant.

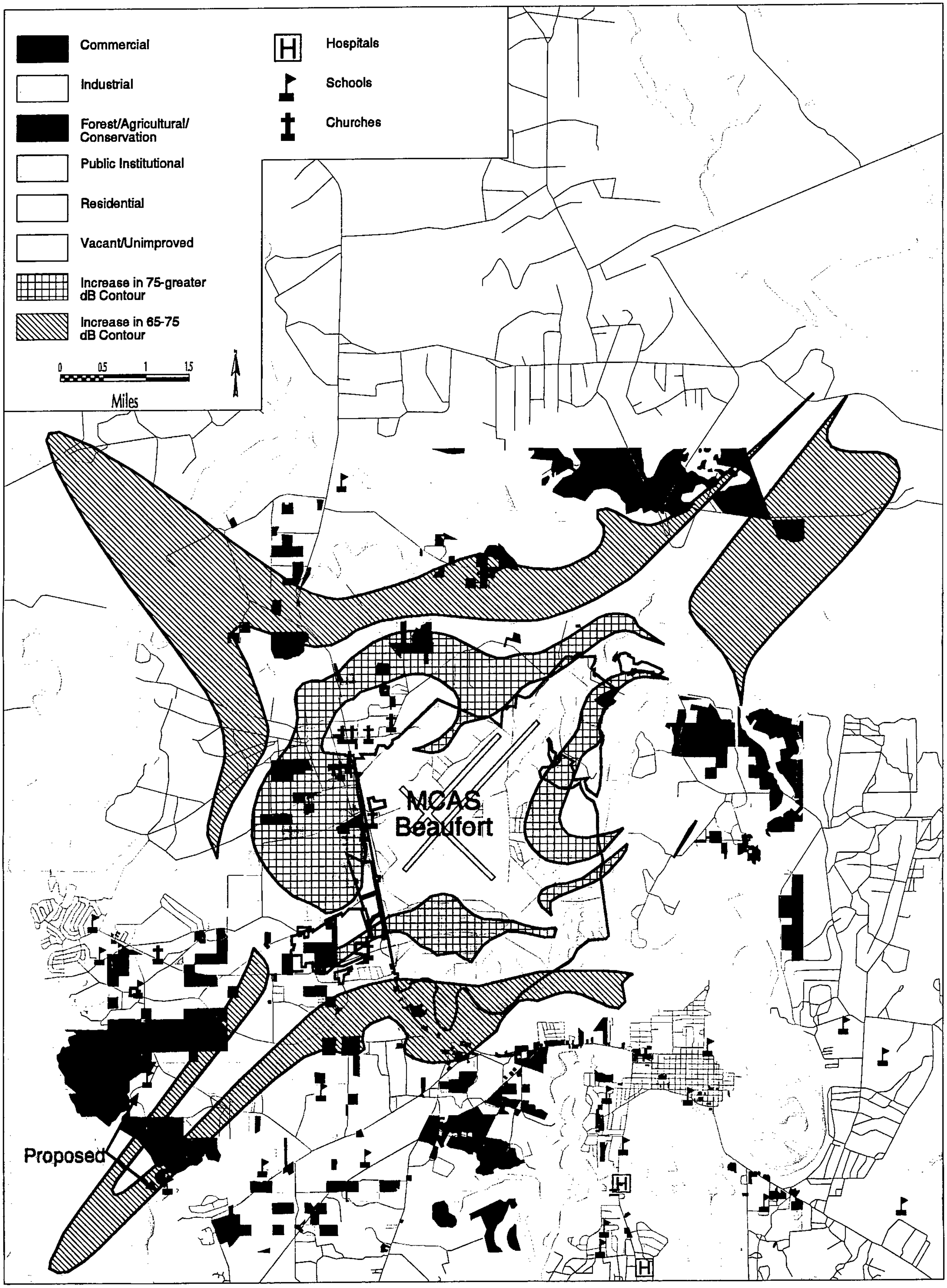
Construction of the runway to support the realignment of F/A-18 aircraft at MCAS Beaufort would result in long-term land use impacts and changes. For land use consistency, the portions of the runway corridor not designated as operations would need to be redesignated as operations in the Master Plan. Where land use inconsistencies occur in the corridor, the impacts would not be significant because the area is relatively undeveloped and existing and proposed land uses would not be significantly incompatible with operational activities.

With regard to the AICUZ program at MCAS Beaufort, noise impacts from the implementation of ARS 4 would result in the expansion of associated noise zones (see Section 7.1.8). Part of the increase is attributable to changes in runway utilization between the 1994 AICUZ and the projected contours. The 65 to 75 dB Ldn contour (i.e., Noise Zone 2) would grow by approximately 6,882 acres (2,786 hectares) from the corresponding area in the station's current AICUZ program. The 75 dB or greater Ldn contour (i.e., Noise Zone 3) would grow by approximately 3,025 acres (1,225 hectares) from the corresponding area in the current AICUZ program. Figure 7.1-1 presents the increase in land use coverage between the existing AICUZ and projected 1999 noise contours at MCAS Beaufort under ARS 4. As shown, larger areas would be exposed to aircraft noise.

With regard to APZs under the AICUZ Program, implementation of ARS 4 would result in changes in the extent of these areas. Figure 7.1-2 presents the projected 1999 APZs, which include APZs under the existing AICUZ program as well as the APZs associated with operations of two additional F/A-18 squadrons. Figure 7.1-3 presents the increase between existing AICUZ and projected 1999 APZs and land use. Under ARS 4, an additional 1,134 acres (458 hectares) of land would be within APZs (see Table 7.1-2).

As discussed in Section 3.1.4, the APZs do not indicate the probability of an accident but rather the probable accident location should an accident occur. Appendix G provides more information on the development of APZs. The Navy's recent update of aircraft accident data for the period from 1982 to 1997 indicates that the F/A-18 experiences fewer accidents than other fighter aircraft in the inventory. In fact, during this period only three F/A-18 Class "A" accidents (i.e., aircraft suffered more than $1 million in damage or a fatality occurred) were reported within a 5-mile radius of Navy and Marine Corps airfields in the U.S. and Japan.

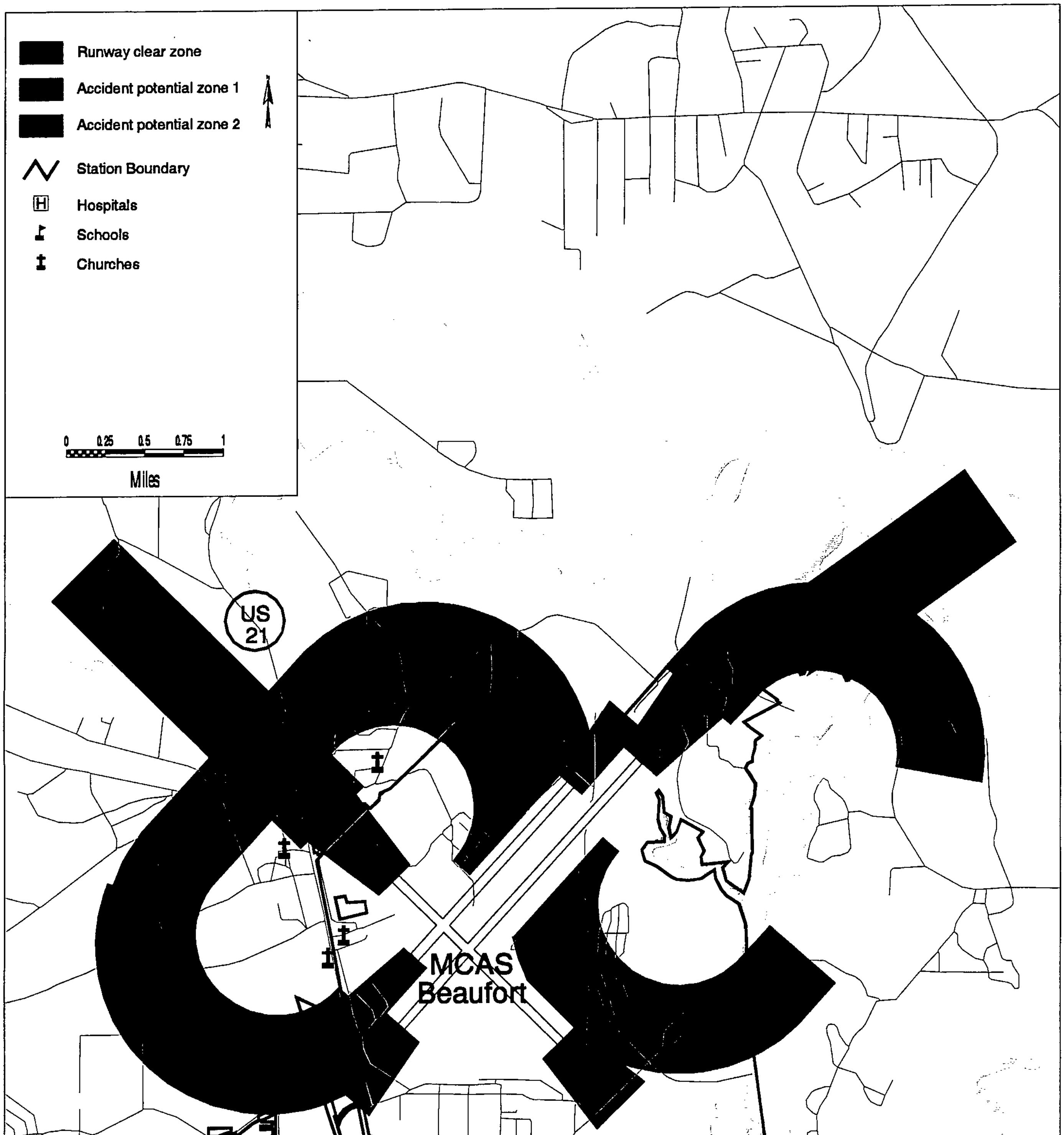
Because Beaufort County has established an AOD ordinance that is based on the station's AICUZ program, AICUZ noise zone and APZ increases associated with the implementation of ARS 4 would have zoning and planning implications that would affect surrounding future land development. These affects would potentially include: an increase in the number of development restrictions implemented (e.g., types of land use activities allowed under the AOD ordinance) and an increase in the number of development actions permitted with conditional restrictions. This may affect availability of federally guaranteed mortgage loans. HUD, FHA, and VA mortgage policies generally prohibit guaranteeing mortgage loans for new homes located within noise contours of 75 dB Ldn or greater or within clear zones. These same mortgage policies make availability of federally guaranteed mortgage loans discretionary for new homes located within noise contours of 65 to 75 dB Ldn.



Source: SOUTHDIV 1994; Wyle Labs 1997

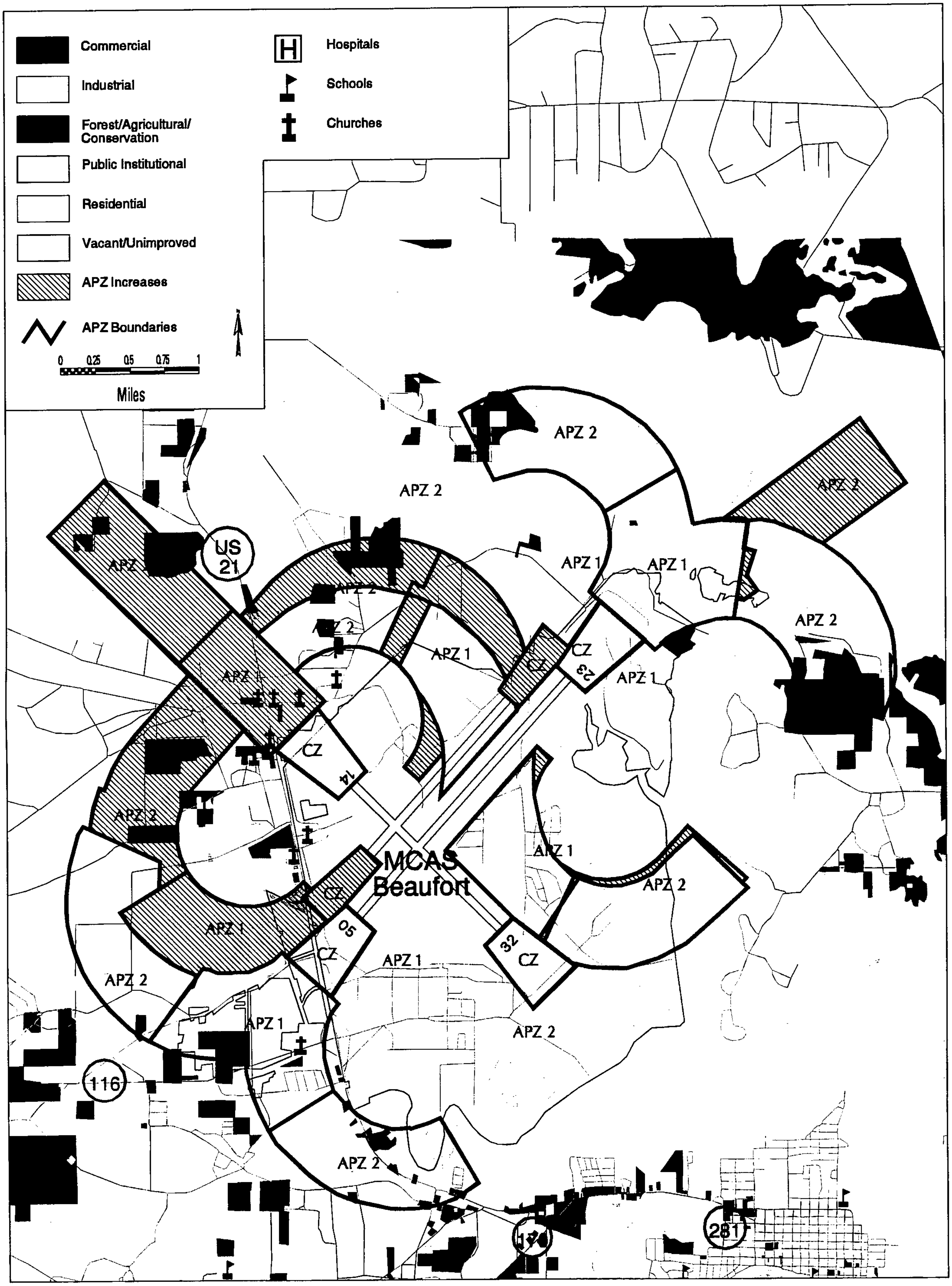
Figure 7.1-1

ARS 4 - Increase Between Existing AICUZ Noise Contours and Projected 1999 Noise Contours and Land Use - MCAS Beaufort



Source: SOUTHDIV 1994; Wyle Labs 1997

Figure 7.1-2
ARS 4 - Projected 1999 APZs
MCAS Beaufort



Source: SOUTHDIV 1994; Wyle Labs 1997

Figure 7.1-3
ARS 4 - Increase Between Existing AICUZ and Projected 1999 APZs and Land Use
MCAS Beaufort

Table 7.1-2

LAND USE WITHIN EXISTING (1994) AND PROJECTED (1999) APZs
AT MCAS BEAUFORT - ARS 4

Land Use	1994 Acres	1994 Hectares	Projected Acres Impacted	Projected Hectares Impacted	Change in Acres/ Hectares
Clear Zone					
Military Installation	498	202	621	251	123/49
Forested/ Agriculture/ Conservation	0	0	0	0	0/0
Unimproved/Vacant	21	8	63	25	42/17
Residential	1	<1	1	<1	0/0
Industrial	0	0	<1	0	0/0
Commercial	0	0	<1	0	0/0
APZ 1					
Military Installation	782	316	756	306	-26/-10
Forested/ Agriculture/ Conservation	59	24	0	0	0/0
Unimproved/Vacant	812	329	1,144	463	332/134
Residential	115	47	136	55	21/8
Industrial	8	3	40	16	40/16
Commercial	1	<1	11	4	11/4
Water	155	62	79	32	-76/-30
APZ 2					
Military Installation	169	68	116	47	-53/-21
Forested/ Agriculture/ Conservation	248	100	285	115	37/15
Unimproved/Vacant	2,049	829	1,823	738	-226/-91
Residential	319	129	178	72	-141/-57
Industrial	59	24	50	20	9/4
Commercial	25	10	44	18	19/8
Water	371	150	479	194	108/44
TOTAL	**5,693**	**2,304**	**6,827**	**2,762**	**1,134/458**

The term "new home" includes new construction, existing homes that are less than one year old, and existing homes that have been substantially remodeled. HUD, FHA, or VA mortgage policies may also impose conditions on mortgage loan guarantees (such as written acknowledgment of noise conditions) for existing homes located in 75 dB Ldn or greater contours or within clear zones.

Because construction of the runway would impact the natural resources of the South Carolina coastal zone, a determination of the project's consistency with the enforceable policies and procedures of the South Carolina Coastal Management Program would be required. Implementation of these projects would require permits/reviews from South Carolina OCRM for wetlands impacts/mitigation, stormwater management, and water quality; however, the Navy has determined that the proposed action would be consistent to the maximum extent practicable with the South Carolina Coastal Zone Management Plan.

Finally, because the runway project would significantly impact the natural resources at the station, appropriate control measures would be required to minimize damage to the station's natural resources as required under the station's Natural Resource Management Plan.

7.1.5 Socioeconomics and Community Services

7.1.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

The relocation of five F/A-18 fleet squadrons to MCAS Beaufort would have a moderate impact on the station's population. The implementation of ARS 4 would result in the transfer of approximately 1,300 personnel (140 officers, 1,150 enlisted personnel, and 10 civilians) to MCAS Beaufort.

When various demographic characteristics of these relocating personnel are taken into account, such as marital status, number of dependents, and household size, the total increase in the regional population would be approximately 2,900 residents (see Table 7.1-3). Given the size of Beaufort County, these new residents would have a relatively small impact on the demographic characteristics of the county as a whole.

Economy, Employment, and Income

The implementation of ARS 4 would have a positive, long-term impact on the economy of Beaufort County and the region as a whole. Total direct military employment would be increased by approximately 1,300 new positions and approximately $50 million would be

Table 7.1-3

NET SOCIOECONOMIC IMPACTS OF THE PROPOSED REALIGNMENT AT MCAS BEAUFORT UNDER ARS 4

	Beaufort	Charleston	Colleton	Hampton	Other	Total Effects
Population Impacts						
Total Military and Civilian Personnel Relocating	1,290	0	0	0	10	1,300
Number of Military Dependents	1,580	0	0	0	20	1,600
Total Population Change	2,870	0	0	0	30	2,900
Personnel and Regional Housing Impacts						
Total Officers and Civilians Relocating	150	0	0	0	0	150
Total Enlisted Personnel Relocating	1,130	0	0	0	20	1,150
Total Military Households Relocating	1,280	0	0	0	20	1,300
Fiscal Impacts						
Total Population Change	2,870	0	0	0	30	2,900
Local Per Capita Tax Contribution	$1,200	$0	$0	$0	NA	NA
Estimated Change in Local Tax Contributions	$3,444,000	$0	$0	$0	$0	$3,444,000
Education Impacts						
Total Elementary School-age Children	380	0	0	0	10	390
Total Middle School-age Children	110	0	0	0	0	110
Total High School-age Children	70	0	0	0	0	70
Total Number of School-age Children	560	0	0	0	10	570

Note: Totals may not add due to rounding.
Less than 10 additional military personnel are expected to live in Charleston, Colleton, and Hampton counties.

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injected into the regional economy each year via military and civilian payroll. Additionally, approximately $171 million would be injected into the regional economy through an increase in construction expenditures needed to accommodate the relocating personnel and aircraft.

Table 7.1-4

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF THE F/A-18 FRS TO MCAS BEAUFORT UNDER ARS 4

Impact	
Direct Economic Impacts	
Increase in Military and Civilian Payroll	$50,398,000
Construction Expenditures	$171,217,000
Total	$221,615,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$32,024,000
Employment Impacts (jobs)	1,500

[a] Indirect economic impacts have only been calculated for construction expenditures.

The RIMS II model was used to quantify the impacts associated with the implementation of ARS 4. As shown in Table 7.1-4, the $171 million construction program would generate approximately $32 million in additional employee earnings and create approximately 1,500 new jobs in the region.

Housing

With the proposed relocation of 1,300 military personnel to MCAS Beaufort under ARS 4, the demand for all types of military controlled housing would increase, with BEQs experiencing the greatest increase. In recognition of the potential negative impacts to the bachelor housing on-station, a 211-room BEQ and a 187-room BEQ would be built to offset the increase in demand for BEQ housing. Upon completion of these two construction

projects, total on-station bachelor housing would be more than adequate to accommodate the relocating personnel. Therefore, BEQs/ BOQs are not expected to be significantly impacted by implementation of ARS 4.

The proposed relocation of 1,300 military personnel, including an estimated 670 families, would create additional demand for military-controlled family housing. Construction of the required three-module hangar and associated parking apron/taxiway would result in the loss of 22 units of housing in the Pine Grove Housing Area, located north of the proposed hangar site. In recognition of the housing requirement, 240 units of family housing would be built in the Laurel Bay Family Housing Area to offset the increase in demand for on-station, military-controlled family housing.

The proposed relocation of 1,300 (bachelor and family) households to the region would have only a minor impact on the regional housing market. Given the small number of households relocating compared to the supply of housing units available, the price and availability of these units will not be significantly affected.

Taxes and Revenues

The proposed realignment would have a positive impact on the generation of tax revenues in the region and in South Carolina as a whole. Property tax, sales tax, and corporate income tax receipts would all increase as a result of the additional economic activity in the area.

Assuming that the current local tax contribution per capita of approximately $1,200 would remain constant, the 2,870 new residents living in Beaufort County would generate approximately $3.4 million each year in local tax revenue.

However, implementation of ARS 4 would increase in the demand for community services and facilities in the region and thus increase local government expenditures. The majority of these additional expenditures would be for public schools.

The Beaufort County Public School System, which would be the only school district significantly affected by the implementation of ARS 4, may be eligible to receive additional impact aid from the U.S. Department of Education for the students relocating to the area, and thus reduce the amount of local government outlays required to educate these children. In addition, with the housing project, a large number of the relocating personnel with school-age dependents would live on-station and the elementary students would attend DoD elementary schools, thereby reducing the total fiscal impact on the school system.

Finally, the additional funds spent by the Navy via construction activities and procurement and payroll expenditures would increase the economic activity in the region,

which, in turn, would increase sales tax and property tax receipts. In addition, many of the relocating personnel would live in private housing, off-station. Property taxes from the purchase or rental of these units would also positively affect the generation of local government revenues. Therefore, the Beaufort County government would not experience any significant negative fiscal impacts as a result of implementing ARS 4.

7.1.5.2 Community Services

The proposed relocation of five F/A-18 fleet squadrons to MCAS Beaufort under ARS 4 is expected to have impacts on community services and facilities similar to those described for ARS 2. However, since more personnel would be relocating to MCAS Beaufort under this alternative, these impacts would be slightly greater than those described for ARS 2. In recognition of the increase in on-station personnel and a corresponding increase in demand for medical services, an 11,250-square-foot (1,045-square-meter) flight line medical clinic is proposed under ARS 4.

The proposed relocation of 2,870 military and civilian personnel and dependents would not significantly impact the provision of fire/emergency services; security services; or recreational services at MCAS Beaufort or in the local community. With the proposed medical clinic, on-base facilities, staffing, and equipment levels should be more than sufficient to handle the increase in demand in medical and other community services created by the relocating personnel. Levels of service in Beaufort County would not be significantly impacted by the additional personnel residing in the county. For example, the total number of fire fighters per resident would remain constant at 1.8 fire fighters per 1,000 residents. Likewise, police protection would not be significantly impacted as there will still be 1.6 police officers per 1,000 residents in Beaufort County after implementation of ARS 4.

The proposed realignment under ARS 4 would increase the total number of school-age children in Beaufort County by approximately 560. The majority of these students would be elementary students (380 children), while the remaining students would be middle school students (110 children) and high school students (70 children).

The total impact of the additional 560 students in Beaufort County Public Schools would be somewhat tempered by the relative size of the school district. The increase in students would represent only a 3% to 4% increase in the total student body of the district. As described in ARS 2, the school district has become accustomed to handling large increases in total enrollment; gains of 400 to 500 students a year are not uncommon. Also, the total capacity of the district will be greatly expanded as a result of a major building and renovation program currently underway. The 240 family housing units proposed in addition to the 280

or more currently planned at MCAS Beaufort would accommodate a large portion of the relocating families. The elementary school children residing in these units would attend DoD-controlled schools rather than the Beaufort County Public Schools. As a result of these factors, the Beaufort County Public Schools would have adequate capacity to handle these additional students. However, both the primary and the intermediate school at the Laurel Bay Family Housing Area are operating at capacity. To increase capacity, two sites for school replacements/additions at the Laurel Bay Family Housing Area have been identified in the MCAS Beaufort Master Plan. The plans for school replacements/additions would need to be updated to include the increased number of school-age children that would result from ARS 4.

7.1.6 Infrastructure

7.1.6.1 Water Supply

Implementation of ARS 4 would result in greater impacts to the water supply systems than those discussed in ARS 2 (see Section 5.1.6.1) Under ARS 4, 1,300 military personnel would be transferred to MCAS Beaufort.

With the proposed construction of two new BEQs (P-411 and P-412) at MCAS Beaufort and 240 units of family housing at the Laurel Bay Family Housing Area, approximately 638 additional military personnel would live on station; those who would reside in family housing units would be accompanied by approximately 288 dependents. Assuming a daily water usage of 80 gallons per person, water demand to the housing areas of MCAS Beaufort would increase by approximately 0.07 MGD. In addition, assuming a daily water usage of 30 gallons per person during an average work day, water demand on base would increase by approximately 0.04 MGD. Therefore, water demand at the base and associated housing areas would increase by 0.11 MGD.

An additional 662 military personnel, with approximately 516 dependents, would reside in Beaufort and surrounding counties. Assuming a daily water usage of 80 gallons per person, water demand would increase by 0.09 MGD.

Based on the water demand at the base and associated housing areas within Beaufort County, the service area for BJSWA would increase by a total of 0.2 MGD, or less than 3% of its available treatment capacity.

Based on an excess capacity of 6 to 9 MGD in BJSWA's water system, no significant impacts to water supply systems would occur under ARS 4.

7.1.6.2 Wastewater System

Because of the proposed residential construction under ARS 4, impacts to wastewater systems would be more than twice those described for ARS 2 (see Section 5.1.6.2). Assuming that wastewater generated at the station equals approximately 80% of the water consumed (ICMA 1988), approximately 0.2 MGD of additional wastewater would be generated for treatment at the Laurel Bay wastewater treatment plant and 0.06 MGD would be treated at the MCAS Beaufort wastewater treatment plant. With an additional 0.2 MGD of wastewater treated at the Laurel Bay wastewater treatment plant, wastewater flow would approach nearly 75% of the plant's design capacity. Under ARS 4, expansion of the wastewater treatment plant is proposed so that sufficient capacity will exist.

Approximately 0.06 MGD of wastewater would be generated at the MCAS Beaufort core area. The plant has a 1.0-MGD design capacity with an average flow rate of 0.30 MGD. With the addition of 0.06 MGD, the plant would only be at 36% of its design capacity and below the NPDES permit limitations.

As described under ARS 2, wastewater treatment in Beaufort County is provided by various methods and entities. Given the relatively small increase in wastewater generated (about 0.07 MGD), no individual system or method of wastewater treatment would be significantly impacted.

7.1.6.3 Stormwater

Impacts to stormwater systems at MCAS Beaufort resulting from ARS 4 would be significantly more than those described for ARS 2. In addition to constructing the proposed MF pad as discussed in ARS 2, land disturbing activities proposed under ARS 4 include construction of a new parallel runway; relocation of the CALA Pad; and construction of a new hangar/parking apron, a flight simulator, two BEQs, a child development center, and family housing. The combination of these projects would result in significantly more impervious surfaces at the station, thereby increasing the amount of stormwater runoff. To control this additional amount of stormwater runoff, quantity and quality control measures for stormwater detention would be incorporated into the construction plans of each project. Stormwater management plans would be developed in accordance with the enforceable policies and procedure of the South Carolina Coastal Management Program (including the S.C. Stormwater Management and Sedimentation Control Act) as implemented through South Carolina's Coastal Zone Rules.

Although there is a potential for the degradation of stormwater runoff due to the increase in impervious surfaces, with design and development of stormwater mitigation facilities, no significant impact would occur.

7.1.6.4 Electrical

Impacts to electrical systems at MCAS Beaufort resulting from ARS 4 would be slightly more than those described for ARS 2, because several of the new facilities would have to be served with electricity. With 1.5 megawatts of excess capacity under peak demand condition, the station has adequate capacity to support the increase demand that would occur under ARS 4.

7.1.6.5 Heating

Impacts to heating systems at MCAS Beaufort resulting from ARS 4 would be slightly more than those described for ARS 2 because of the greater number of facilities that would require service. However, no significant impacts would occur.

7.1.6.6 Jet Fuel

As stated in Section 3.2.6.6, the recent upgrades to the jet fuel system increased the capacity to fuel aircraft. However, under ARS 4, additional fueling capacity, consisting of a twin stainless-steel piping connection to the existing fuel farm and two fuel storage tanks, would be constructed near the proposed three-module hangar. This will provide the hotpit refueling capability to service four F/A-18s simultaneously.

7.1.6.7 Solid Waste Management

Using the same generation rates discussed in ARS 2 (see Section 5.1.6.7), municipal solid waste in the county would increase by approximately 3,480 tons per year under ARS 4. This would compare to approximately 1,300 tons per year under ARS 2. This increase in tonnage is less than 3% of the total tonnage received at the Hickory Hill landfill facility every year. No significant adverse impacts to regional landfill facilities would occur under ARS 4.

7.1.7 Transportation

The impacts of ARS 4 on roadways in the vicinity of MCAS Beaufort would be slightly greater than those described for ARS 2. Table 7.1-5 and Figure 7.1-4 compare

Table 7.1-5

PROJECTED TRAFFIC CONDITIONS FOR THE AREA SURROUNDING MCAS BEAUFORT UNDER ARS 4

Roadway	Segment	AADT Without Proposed MCAS Beaufort Realignment	LOS	AADT Including Proposed MCAS Beaufort Realignment	LOS
U.S. 21	S 71 to S 38	12,520	A	13,216	A
U.S. 21	SC 116 to S71	18,476	A	19,172	A
U.S. 21	SC 280 to SC 116	28,200	B	32,550	C
U.S. 21	SC 170 to SC 280	28,807	B	31,707	B
SC 116	Laurel Bay Family Housing Area to U.S. 21	8,265	B	9,019	B
SC 170	SC 280 to US 21	21,393	F	16,915	F
SC 280	SC 23 to SC 170	16,288	F	16,868	F
SC 280	SC 170 to U.S. 21	12,884	C	13,754	D

Key:

A = Free flow conditions.
AADT = Annual Average Daily Traffic.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds, however, low manueverability.
E = Traffic at capacity of segment, unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no manueverability.
LOS = Level of service.

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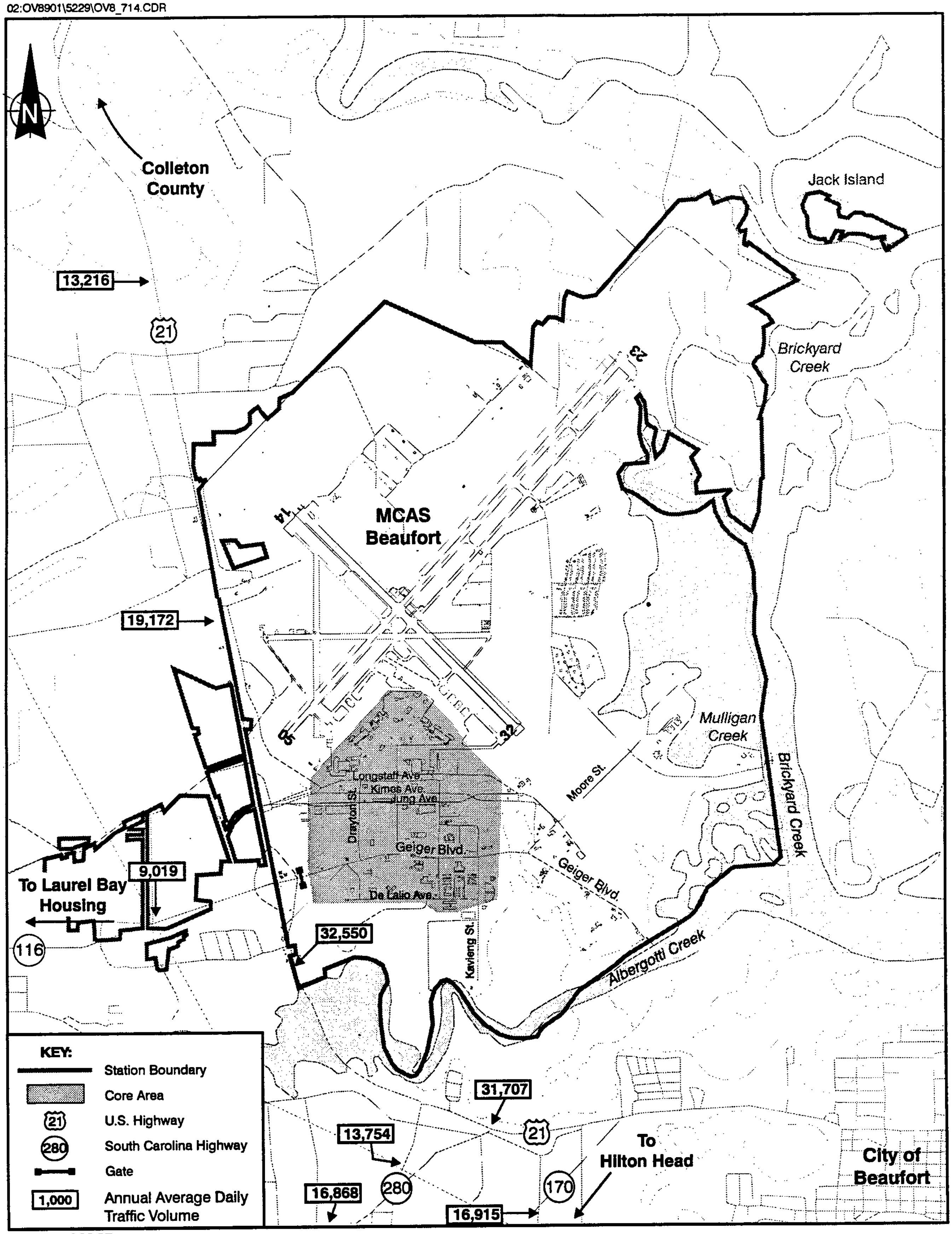


SOURCE: SCDOT 1996

SCALE
0 1,075 2,150 Meters
0 3,527 7,054 Feet

Figure 7.1-4 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING MCAS BEAUFORT FOLLOWING REALIGNMENT UNDER ARS 4

projected traffic on the roadways in the vicinity of the station under ARS 4 to currently projected traffic without the proposed realignment.

7.1.7.1 Regional Road Network

Under ARS 4, there would be a greater increase in the number of new trips than under ARS 2. U.S. 21 between SC 280 and SC 166 would degrade from LOS B to C, and SC 280 would deteriorate from LOS C to D. Unacceptable LOS conditions in the vicinity of the station (Routes SC 170 and SC 280) are the result of existing traffic volumes and projected traffic growth in the region. Although ARS 4 would result in additional traffic on these thoroughfares, actual impact on transportation would be, in most cases, negligible because the influx of traffic would be small relative to the existing traffic flows. Traffic associated with ARS 4 would not contribute significant loads to these road segments. These regional issues will be addressed by regional road improvements that are already planned (see Section 3.2.7).

7.1.7.2 Station Road Network

The impacts of ARS 4 on roadways at the station would be slightly greater than those under ARS 2; however, the station roadway network has sufficient excess capacity to accommodate additional traffic that would be generated under ARS 4.

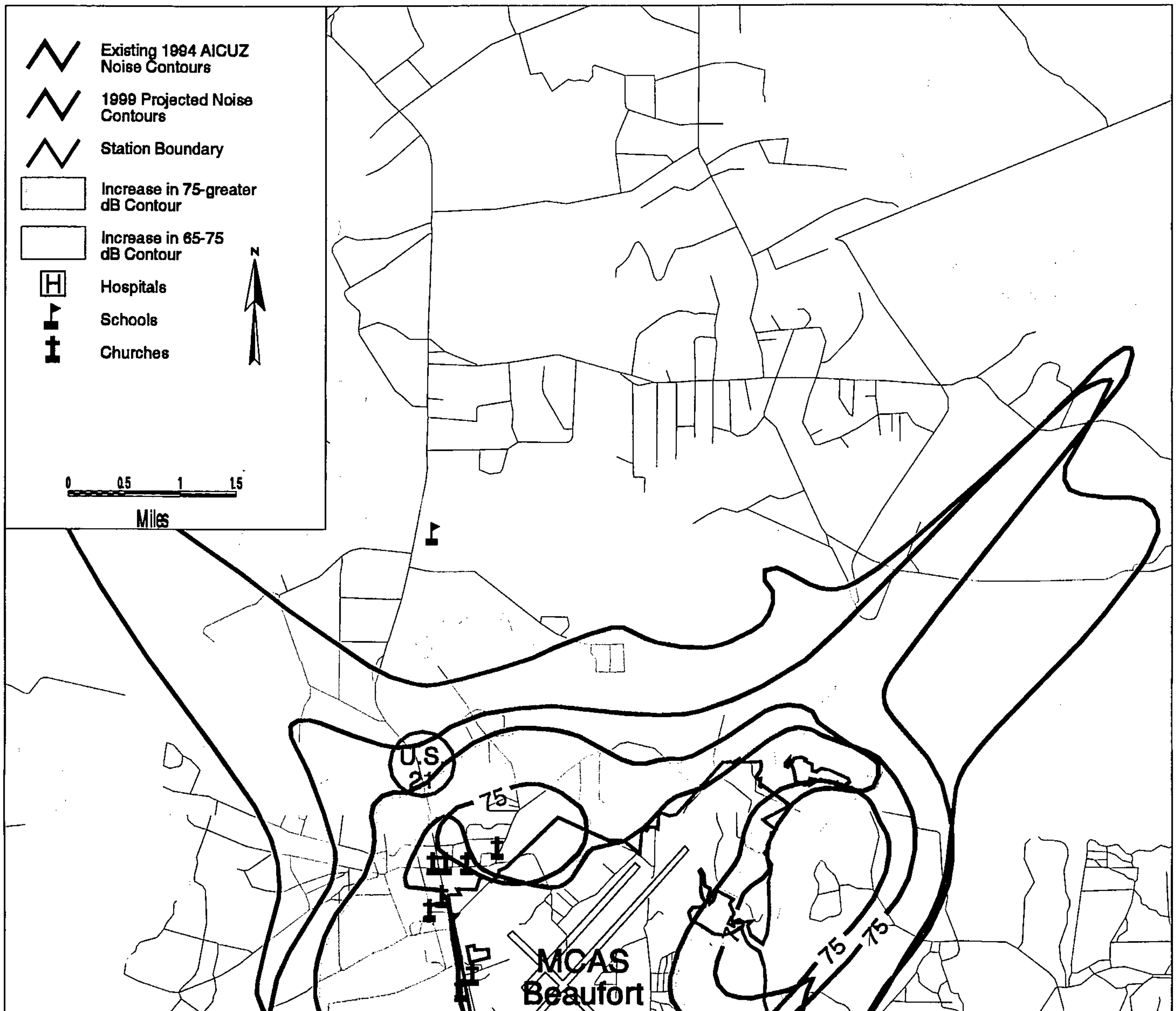
7.1.7.3 Planned Road Improvements

As under ARS 2, traffic projected under ARS 4 would not significantly affect the feasibility of any proposed road improvements in the region.

7.1.8 Noise

Long-term increases in noise exposure levels around MCAS Beaufort would occur as a result of increased aircraft operations associated with ARS 4. These noise increases would result in a significant impact on people living near the air station.

The Navy has conducted an aircraft noise study to examine the impacts resulting from operations of the incoming F/A-18 squadrons under ARS 4 (Wyle Labs 1997). As with previous AICUZ studies conducted at the station, this study involved the use of DoD's NOISEMAP model to project Ldn contours in 1999, when realignment at the station would be completed. As with ARS 2, these projections were made using ABD operations. A discussion of Ldn as a relevant noise metric is presented in Section 3.1.8 and Appendix H.



Source: SOUTHDIV 1994, Wyle Labs 1997

Figure 7.1-5
ARS 4 - Comparison of Existing and Projected 1999 Average Busy Day Noise Contours
MCAS Beaufort

Figure 7.1-5 depicts projected 1999 ABD Ldn contours compared to the existing 1994 AICUZ contours. As shown, both the 65 and 75 Ldn contours change in configuration and cover much greater areas than the respective AICUZ contours, or those associated with ARS 2.

Table 7.1-6 compares the estimated area and population within the 1994 AICUZ contours to the projected 1999 noise contours under ARS 4. The projected 1999 65 to 75 dB noise contour for ARS 4 would cover an area of 12,894 acres (5,220 hectares), with an estimated population of 4,295 people. The 75 dB or greater contour would cover an area of 3,025 acres (1,225 hectares), with an estimated population of 942 people (Wyle Labs 1997). As noted under ARS 2, although both of these areas/populations would be relatively large increases from the 1994 AICUZ areas, MCAS Beaufort experienced one of the lowest levels of aircraft operations (based on historical averages) in 1994.

Table 7.1-7 presents the decrease in area and population noise exposure relative to the 1994 AICUZ. An estimated population of 333 people would experience a reduction in noise levels due to existing flight tracks and runway utilization.

Population coverages are based on the 1990 population census. Although Beaufort County's population is estimated to have grown nearly 20% between 1990 and 1995, the 1990 census is used in all noise analyses in this DEIS for the purpose of consistency.

Environmental impacts associated with increased noise are discussed in detail in Section 4.8. Sensitive noise receptors are shown on Figure 7.1-5. No schools are located in the projected 65 Ldn or greater contour. However, Beaufort County is considering two sites for new school construction. At one of the school sites, noise exposure would be 65 dB Ldn (61 Leq) under ARS 4. Assuming 25 dB attentuation with air conditioning operating and windows closed, the interior noise exposure should be less than 45 dB, with no additional sound attenuation necessary.

The maximum sound levels of typical F/A-18 events that would be conducted at MCAS Beaufort are shown in Table 7.1-8. Table 7.1-9 presents the projected average busy day operation of F/A-18 aircraft.

The noise contours as presented in Figure 7.1-5 represent the projected flight operation plan. The station continually evaluates noise mitigation options to reduce the noise impacts on the local community. These include an evaluation of:

- Arrival and departure procedures;
- Airfield hours of operation;

Table 7.1-6 OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1994 AICUZ AND PROJECTED 1999 NOISE CONTOURS MCAS BEAUFORT - ARS 4						
	1994 AICUZ		1999 Noise Contours		New Area/Population Exposed Relative to 1994 AICUZ[a]	
Ldn	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	8,409 (3,403)	2,847	12,894 (5,220)	4,295	6,882 (2,786)	2,236
75 dB or greater	1,028 (416)	317	3,025 (1,225)	942	2,847 (1,152)	891
Total	9,437 (3819)	3,164	15,919 (6,445)	5,237	9,729 (3,938)	3,127

Note: Numbers exclude water areas.

a Represents only new area/population that previously were not exposed to listed noise levels under 1994 AICUZ. Does not equal the difference between 1994 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
Ldn = Day-night average noise level.
dB = Decibel.

Source: Wyle Labs 1997.

Table 7.1-7 DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE RELATIVE TO 1994 AICUZ MCAS BEAUFORT-ARS 4		
Reduction in Ldn	**Area in Acres (Hectares)**	**Estimated Population**
75+ to 65 - 75 dB	-399 (-215)	-170
65 - 75 to <65 dB	-532 (-162)	-163
Total	-931 (-377)	-333

Note: Numbers exclude water areas.

Key:

Ldn = Day-night average sound level.

Table 7.1-8 MAXIMUM SOUND LEVELS at 1,000 FEET AGL (decibels)	
	F/A-18
Departures	108
Arrivals	104
Touch-and-Go	97
FCLP	97

Table 7.1-9 MCAS BEAUFORT PROJECTED AVERAGE BUSY DAY OPERATIONS FOR SELECTED (F/A-18) SORTIES		
	Project Increase Under ARS 2	Total Marine Corps/Navy F/A-18s
Departures	19	60
Arrivals	19	60
Touch-and-Go	18	28
FCLP	26	48

- Pattern altitudes;
- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

MCAS Beaufort would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation.

7.1.9 Air Quality

7.1.9.1 Air Quality Regulations

Air quality is governed by the Clean Air Act and its implementing regulations. The primary regulations affecting ARS 4 at MCAS Beaufort are the NAAQS. The base is located

in AQCR3-Coastal and is designated attainment for all pollutants. The rest of South Carolina is also designated attainment for all pollutants.

The baseline year for data from MCAS Beaufort is 1997 (Wyle Labs 1997). Actual 1995 stationary source emission inventory data were projected to remain valid for 1997 since only minor operational changes are projected to occur between 1995 and 1997. These minor changes would not affect emission levels.

7.1.9.2 General Conformity Rule

As discussed in Section 3.2.9.2 and above, the entire State of South Carolina is classified as attainment for all criteria pollutants. Therefore, the air quality effects of ARS 4 at MCAS Beaufort are exempt from the General Conformity Rule. While slight increases in air pollutant emissions are projected at the station, these would represent insignificant impacts and would be consistent with the goals and objectives of the South Carolina SIP.

7.1.9.3 Projected Emissions at MCAS Beaufort

The implementation of ARS 4 would result in slight increases in air pollutant emissions, primarily associated with increased aircraft operations and maintenance activities at the station. Table 7.1-10 presents projected 1999 air emissions at MCAS Beaufort associated with ARS 4. The following discusses the sources of these projected emissions.

Aircraft Operations

An increase in air pollutant emissions would occur primarily due to increased flight operations, engine testing (in- and out-of frame), and painting at MCAS Beaufort under ARS 4. Projected 1999 aircraft operations (Wyle Labs 1997), emission factors and methods described in Appendix E were used to project these emissions. Emissions were estimated to be 164 tons per year of VOCs, 173 tons per year of NO_x, 458 tons per year of CO, 8 tons per year of SO_2, and 83 tons per year of PM_{10}.

Other Mobile Sources

Projections of engine testing requirements were used to estimate projected in-frame maintenance run-up emissions (Wyle Labs 1997). Emissions were estimated to be 14 tons per year of VOCs, 24 tons per year of NO_x, 37 tons per year of CO, 0.7 ton per year of SO_2, and 10 tons per year of PM_{10}.

Table 7.1-10

PROJECTED 1999 EMISSIONS SUMMARY FOR MCAS BEAUFORT UNDER ARS 4
(tons per year)

Source Type	VOCs	NO_x	CO	SO_2	PM_{10}
Mobile Sources					
Aircraft	163.99	172.83	457.94	8.09	83.14
Other Mobile Sources					
Maintenance Run-ups	14.17	23.66	36.64	0.72	10.22
Total Mobile and Other Mobile	178.16	196.49	494.58	8.81	93.36
Stationary Sources					
Boilers	0.18	9.89	2.14	13.00	1.32
Generators	1.29	6.14	26.46	0.40	0.43
Engine Test Cells	11.54	57.46	115.02	2.90	11.63
JP-5 storage tanks	4.63	0.00	0.00	0.00	0.00
Degreasing	11.42	0.00	0.00	0.00	0.00
Painting	4.54	0.00	0.00	0.00	0.09
Open burn/detonation	0.08	0.03	0.08	0.00	0.07
Carpentry	0.00	0.00	0.00	0.00	0.48
Total Stationary	33.68	73.52	143.70	16.30	14.02
Total	211.84	270.01	638.28	25.11	107.38

Key:

CO = Carbon monoxide.
NO_x = Oxides of Nitrogen.
PM_{10} = Particulate matter.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compound.

Stationary Sources

MCAS Beaufort's Title V operating permit will, upon approval, govern emissions from stationary sources. The station's air emission inventory that supported this permit included projections of future stationary source emissions associated with the addition of up to two F/A-18 squadrons at the station (Radian 1994). The Title V permit will allow for operations that would generate additional stationary source emissions. The five-squadron increase associated with ARS 4 may require amendment of the permit to accommodate additional stationary source emission levels.

Some stationary-source emissions at MCAS Beaufort would increase compared to existing emission levels as a result of ARS 4. Engine testing at out-of frame test cells, JP-5 fuel handling, and degreasing and painting emissions are projected to increase. VOCs were estimated at 34 tons per year, NO_x at 74 tons per year, CO at 144 tons per year, SO_2 at 16 tons per year, and PM_{10} at 14 tons per year.

Construction Emissions

The construction requirements for MCAS Beaufort under ARS 4 are presented in Section 2.4. The projects consist of new buildings; expansion/renovation of existing buildings on base; additional hangar space; a new parallel runway, taxiways, and aprons; and additional family housing at the Laurel Bay Family Housing Area.

Construction emission calculation methods presented in Appendix A of Appendix E (Air Conformity Determination) were followed for these construction projects. All construction projects are assumed to occur in a single year (1998). The total emissions by pollutant are: 13 tons of VOCs, 126 tons of NO_x, 13 tons of SO_2, 42 tons of CO, and 12 tons of PM_{10}. These emissions are not cumulative with projected emissions from aircraft and other base operations occurring in 1999.

7.1.9.4 Total Projected Emissions

The net change in emissions from 1997 to 1999 is shown in Table 7.1-11. Emissions would increase 70 tons per year for VOCs, 107 tons per year for NO_x, 185 tons per year for CO, 4 tons per year for SO_2, and 47 tons per year for PM_{10}. Although these net emission increases are larger than those projected under ARS 2 for MCAS Beaufort, they would not significantly affect air quality in the region surrounding the station.

Table 7.1-11

NET CHANGE IN AIR EMISSIONS BETWEEN 1997 AND 1999 AT MCAS BEAUFORT - ARS 4 (tons per year)

Year	VOCs	NO_x	CO	SO_2	PM_{10}
MCAS Beaufort					
1997	141.68	162.80	452.80	20.84	60.37
1999	211.84	270.01	638.28	25.11	107.39
Net Change					
1997 to 1999	70.16	107.21	185.48	4.27	47.02

Key:

CO = Carbon monoxide.
NO_x = Oxides of nitrogen.
PM_{10} = Respirable particulate.
SO_2 = Sulfur dioxide.
VOC = Volatile organic compound.

7.1.10 Topography, Geology, and Soils

7.1.10.1 Topography

The proposed construction and operations under ARS 4 would not impact the topography at MCAS Beaufort.

7.1.10.2 Geology

The proposed construction and operations under ARS 4 would not impact the geologic resources underlying the station.

7.1.10.3 Soils

The overall impacts on soils at the proposed project site under ARS 4 would be associated primarily with short-term construction activities. These would be of much greater intensity than ARS 2. Temporary impacts on soils would be associated only with the proposed projects and would include compaction and rutting by vehicular traffic, and potential erosion of soils during the construction phase of the project. These impacts will be offset by employing standard soil erosion and sedimentation control measures during construction.

7.1.11 Water Resources

7.1.11.1 Surface Water

Implementation of ARS 4 would result in minor adverse effects to water quality. Both short- and long-term impacts would result from the construction/operation of the parallel runway, CALA Pad, and the parking apron/taxiway. Only short-term impacts would result from the construction of the remainder of the facilities. The construction of the parallel runway would result in the channelization and culverting of several minor tributaries to Brickyard Creek. Most of these, including a portion of the drainage through the salt marsh, are currently culverted to some extent. The primary impact would be loss of considerable natural channel substrate. This would represent a loss to not only the invertebrate and fish populations that inhabit the stream, but also to mammal populations from adjacent wetlands and uplands that use the stream as forage and water supply. The loss of the natural stream channel, and the adjacent wetland and upland vegetation, would result in a general loss of buffering capacity provided by the ecosystem. The resultant culverted stream sections would primarily carry runoff from the developed portions of the station directly out into the salt marsh. Use of existing stormwater controls (e.g., retention ponds) located on-base would minimize impacts to surface water. In addition, the general availability of surface waters in and near MCAS Beaufort and the daily tidal fluctuations in Brickyard Creek minimize the extent and degree of these impacts to surface waters.

The remainder of the proposed facilities occur within the core area. These sites would be located in upland areas with minimal drainage development or in previously paved and developed areas. Impact to surface waters from these facilities would be limited to temporary impacts that could occur from construction activities, resulting in minor sedimentation into the existing base drainage system.

The construction of additional housing at the Laurel Bay Family Housing Area would occur entirely in upland areas. However, the proposed area is surrounded by wetlands that drain to Whale Branch and the Broad River. Removal of upland vegetation from the new housing sites would minimize the stormwater buffering capacity of natural vegetation prior to discharge to the adjacent wetlands. Short-term impacts involve the potential discharge of construction-related sediment into the adjacent waters. This impact would be adequately mitigated through the development of an appropriate Storm Water Management Plan that would be prepared as part of the NPDES stormwater discharge permit required for any construction activities. Long-term stormwater discharge from the housing project would be under an existing Navy/Marine Corps NPDES group permit.

The addition of 240 housing units would add to the volume of wastewater discharge into the Broad River from an on-site wastewater treatment plant. Upgrades to the system are scheduled for October 1996 through December 1997. Further expansion of the treatment plant will be conducted under ARS 4 and the existing NPDES permit modified as necessary. Therefore, permit violations are not anticipated from implementation of ARS 4.

7.1.11.2 Groundwater

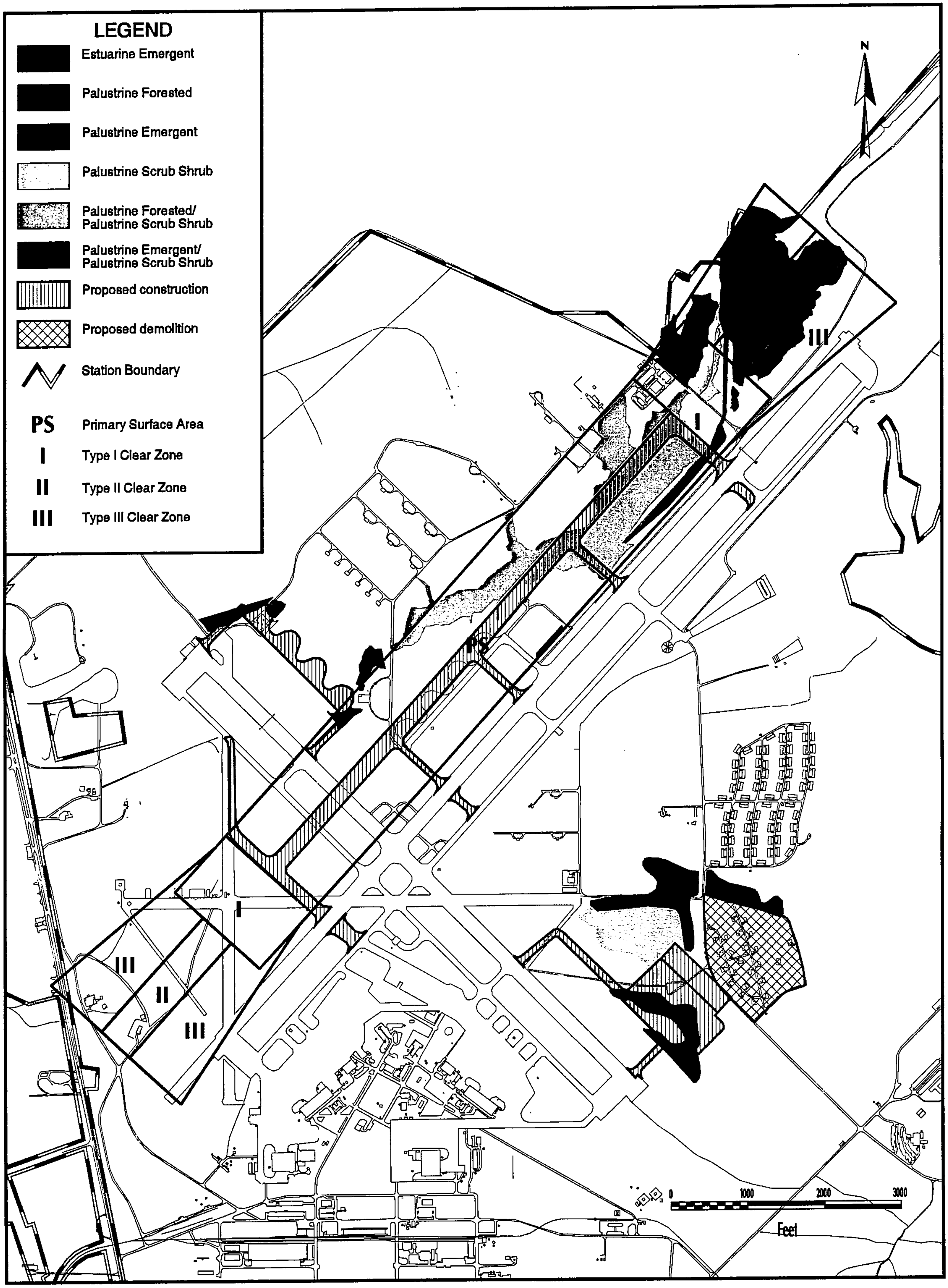
The area's groundwater resources would not be affected under ARS 4. The availability of groundwater in the area or the quality of the water withdrawn would not be affected. Although recharge of the Floridan Aquifer occurs on MCAS Beaufort, an increase in impervious surface areas resulting from the proposed actions under ARS 4 is insignificant and would not significantly decrease the amount of water recharged into the Floridan Aquifer.

7.1.11.3 Wetlands

Three of the proposed facilities (i.e., the parallel runway, the CALA Pad, and the 3-module hangar/parking apron) would result in the loss of wetland acreage (see Figure 7.1-6). The relocation of the CALA Pad would result in the direct loss of 1.98 acres (0.80 hectare) of palustrine forested wetland, with minor impacts to three separate wetlands. Additionally, potential short term impacts to adjacent wetlands could result from construction-related sedimentation.

The new three-module hangar and parking apron construction would result in impacts to two wetlands. Total wetland loss would be 0.96 acre (0.39 hectare) of palustrine scrub-shrub wetland and 8.34 acres (3.37 hectares) of palustrine forested wetland. The loss of scrub-shrub wetland is minor; the acreage represents a small portion of a larger wetland complex with similar characteristics. The forested wetland impacts are a large part of the total acreage for the wetland, limiting the habitat usefulness of the remaining wetland. However, other large forested wetlands both on- and off-base provide habitat similar to that of the impacted wetlands. The prevalence of other similar habitat on base and on adjacent lands minimizes the overall impact of the loss of the acreage.

For the purposes of analyzing impacts associated with construction of the new parallel runway, the clear zones are subdivided into Types I, II, and III, consistent with NAVFAC P-80 guidelines. It is necessary to consider clear zone subdivisions because of the different requirements associated with each.



Source: Donnelly 1997; USFWS n.d.

Figure 7.1-6
Wetlands Within Proposed Development Areas at MCAS Beaufort

The greatest impact would result from the construction of the parallel runway. A total of 139.28 acres (56.38 hectares) of wetlands falls within the proposed footprint of the new runway and associated clear zones. However, because the impacts in the Type II and Type III clear zones would be restricted to the nonmechanized clearing of forested and shrub-scrub wetlands, the total wetland impact would be considerably less. Impacts to the primary surface area (inclusive of the paved runway surface) and Type I clear zone total 83.38 acres (33.75 hectares), consisting of 9.09 acres of PFO, 64.58 acres of PFO/PSS, 2.41 acres of PSS, 0.52 acre of PSS/PEM, and 6.78 acres of estuarine wetland. Activities associated with the construction of the parallel runway would require the clearing and grading of these entire areas, with portions of the area being permanently paved. Maintenance of existing drainages across this area may allow for the continued existence of small linear PEM or EEM wetlands. However, the construction activities within the primary surface and Type I clear zones would result in the long-term loss of most of the identified wetland acreage within the zones. Additional short-term impacts could result to adjacent wetland areas from construction-related sedimentation.

Construction activities within the Type II and Type III clear zones would require only the nonmechanical clearing of woody vegetation. This would result in the permanent conversion of 4.76 acres of forested and scrub-shrub wetland to emergent wetland. A total of 51.28 acres of estuarine wetland falls within Type II and Type III clear zones and would not be directly impacted by construction activities.

The construction of additional family housing units at the Laurel Bay Family Housing Area could impact adjacent wetlands through temporary increases in erosion and sedimentation during the construction period. No loss of wetland acreage is expected to occur at this location. Erosion control devices such as silt fences could be used where the wetland is adjacent to the construction site to eliminate the possibility of sedimentation impacts.

Under the authority of Executive Order 11990, *Protection of Wetlands*, federal agencies are required to adopt a policy "to avoid to the extent possible the long-and short term adverse impacts associated with the destruction and modification of wetlands and to avoid the direct and indirect support of new construction in wetlands whenever there is a practicable alternative." In addition, implementation of USACE/USEPA guidelines for wetland mitigation provide a hierarchy of avoidance, minimization, and compensation. Mitigation compensation is accepted only after the satisfactory demonstration of reasonable avoidance and minimization. Preliminary design estimates indicate that construction of the parallel runway and relocated CALA Pad would result in the permanent loss of 85.36 acres (34.54 hectares) of wetlands and the conversion of 4.76 acres of forested and shrub-scrub wetlands to

emergent wetlands. An additional 9.30 acres (3.76 hectares) of disturbed wetland would be lost in association with the three-module hangar/parking apron. Final design development may further reduce this impact, and efforts would focus on avoiding or minimizing impacts to wetlands. Complete avoidance of wetlands is not possible under this alternative because of airfield design criteria requiring separation distances and associated clear zones.

When avoidance is not feasible, then impacts would need to be minimized. As noted above, wetland impacts would primarily result from construction activities associated with the parallel runway. The present alignment represents the minimum facility size necessary in terms of safety and operations. The opportunity exists, however, to implement appropriate mitigation measures to minimize/neutralize adverse impacts resulting from construction of these facilities. For example, short-term impacts could be mitigated by establishing proper erosion control structures at the edge of the impact area to minimize sedimentation flow into adjacent wetland areas. Appropriate construction mitigation techniques (e.g., erosion and sedimentation control) would be used to minimize impacts to wetlands.

Compensation would be required for long-term impacts resulting from lost wetland acreage that cannot be avoided or minimized. Compensation/mitigation can be accomplished through creation of new wetlands or enhancement, restoration, or preservation of existing wetlands. Potential mitigation includes creation and enhancement of existing wetland areas at the Laurel Bay Family Housing Area, land currently in agricultural outlease owned by the Air Station or use of mitigation banks in South Carolina. At Laurel Bay, there is approximately 779 acres of forested land available and 400 acres in agricultural outlease. These activities would need to be incorporated into a wetland mitigation plan, developed in consultation with the USACE and South Carolina OCRM, and approved by USACE via the Clean Water Act Section 404 permit process. USACE does not have any established mitigation ratios in terms of acre-for-acre replacement. Instead, they have developed a functional model that requires comparison of the impact area and potential mitigation area. Mitigation is considered appropriate and acceptable if determined functions and values, based on an approved evaluation technique, for the proposed mitigation/replacement wetlands are greater than or equal to the impacted wetland area.

7.1.12 Terrestrial Environment

7.1.12.1 Vegetation

Implementation of ARS 4 would require approximately 600 acres (117 hectares) of land at MCAS Beaufort and approximately 50 acres of land at the Laurel Bay Family Housing Area. Table 7.1-12 provides approximate acreages of the primary vegetative cover types

Table 7.1-12

VEGETATION IMPACTS AT MCAS BEAUFORT
ARS 4

Proposed Action	Impacts by Vegetation Type (in Acres)				
	Wetlands	Loblolly/ Slash Pine	Mixed Pine/ Hardwoods[a]	Long leaf Pine	Sweetgum/ Water Oak
MCAS Beaufort					
Parallel runway	83.38	53.00	110.00		
CALA Pad relocation	1.98	0	8		
Hangar/parking apron	9.30	0	19.80		
Family Housing[b]		12.5	12.5	12.5	12.5
Other facilities		12.66	0		
Total	94.66	78.16	140.30	12.5	12.5

a This vegetation type includes mixed forested and shrubby vegetation.
b The exact location of these housing units within the proposed 121-acre site has not been determined; therefore, vegetative impacts are proportioned for the types of vegetation within the entire 121-acre site.

affected by the proposed construction projects. Acreage not included in Table 7.1-12 is developed land or existing buildings. Large areas of the loblolly/slash pine, mixed pine/hardwood upland, and wetland communities are available in the surrounding areas of the base; therefore, the overall impacts on these vegetation types is considered to be minor. The long leaf pine at the proposed housing site is part of a 252-acre mature long leaf pine stand that is a unique habitat. Although the proposed action would only impact approximately 12 acres of this 252-acre stand, additional housing proposed at this site would have a cumulative impact on the stand.

Impacts to vegetation from the construction of family housing at the Laurel Bay Family Housing Area have been addressed under previous NEPA documentation. Construction of additional units at this location would not affect additional acreage. The greater number of

units may result in less open space and fewer trees within the housing complex but would not require additional acreage of undeveloped land.

7.1.12.2 Wildlife

The activities proposed at MCAS Beaufort under ARS 4 would result in impacts to wildlife resources. As presented in Table 7.1-12, the activities would affect approximately 95 acres of wetlands and 194 acres of forested or shrubby lands that are not presently developed. Construction and other activities in these areas would result in direct and indirect impacts on local wildlife. Direct effects include mortality of less mobile species such as small mammals, reptiles, and amphibians. The loss of habitat results in indirect effects on wildlife through migration to other areas and overall loss in population for the base. However, none of the communities affected are unique or rare habitats, and the areas impacted represent small percentages of available undeveloped habitats at the base. Therefore, effects of construction on wildlife populations and ecosystems are expected to be minor.

The remainder of the acreage affected by this ARS consists of developed portions of MCAS Beaufort, which provide little habitat for wildlife beyond those species adapted to disturbed, developed human environments. There would be minimal loss of habitat availability and limited mortality to smaller mammals and reptiles. Considerable similar habitat exists at the base, resulting in minimal overall impact resulting from implementation of this ARS.

7.1.12.3 Threatened and Endangered Species

The American alligator and the least tern are known to occur on the base and may be found in the salt marsh wetland located in the proposed parallel runway project area. Most of the impact to the salt marsh would result from imposition of a clear zone, which restricts aboveground obstructions (i.e., precludes growth of woody vegetation but not herbaceous vegetation). As a result, the impact to the wetland would be limited to removal of vegetation from the portion of the wetland farthest from the salt marsh outlet to Brickyard Creek. The most suitable habitat for the alligator, including basking mud bars at low tide and any beach/shore areas above the reach of ordinary high tide, would not be impacted. In addition, the most suitable habitat for the least tern (i.e., salt marshes) would not be impacted. Therefore, there would be no effect on the American alligator or least tern.

Known populations of pondberry (*Lindera mellissifolia*) and pondspice (*Litsea aestivalis*) are located on the northwestern portion of MCAS Beaufort but would not be affected by proposed construction or clearing. Other activities proposed at MCAS Beaufort

and the Laurel Bay Family Housing Area would not be expected to affect threatened or endangered species.

7.1.13 Cultural Resources

7.1.13.1 Archaeological Resources

The implementation of ARS 4 would result in adverse effects on cultural resources and may have adverse effects on currently unknown archaeological sites. A MOA will be established with the SCDAH to identify impacts (as discussed below) and mitigation required to offset these impacts.

CALA Pad/Parallel Runway

The construction of the proposed runway would affect four archaeological sites recorded with the SCDAH that have been determined to be potentially NRHP-eligible. These sites are 38BU1340, 38BU1342, 38BU1357, and 38BU1501. Adverse effects may include elimination of meaningful patterns of vertical and horizontal stratigraphy; destruction of subsurface features; mixing of temporally distinct components; and redeposition and destruction of artifacts and ecofacts. If avoidance of these sites is not feasible, SCDAH would require a Phase II archaeological evaluation for the purpose of determining the NRHP eligibility status.

With regard to on-station cemeteries, the Givens Cemetery is located within the proposed Type I clear zone and may be impacted by the construction of the parallel runway. Prior to construction, archival research and archaeological investigation would be conducted to determine the number and identity of buried individuals and to evaluate the NRHP eligibility of the cemetery. SCDAH would be consulted regarding proper mitigation measures (i.e., relocation) if avoidance of the cemetery is not feasible.

Howard Cemetery lies within the boundary of the proposed Type III clear zone. This location would undergo the topping of trees to ensure the visibility of the runway lightings to the approaching aircraft. If possible, the topping of trees and the removal of branches would be done manually, avoiding the impact of heavy machinery. If adverse effects to the ground surface cannot be avoided, the cemetery would be evaluated for NRHP eligibility, and mitigative measures would be developed in consultation with SCDAH. Archival research and field investigation would be required to determine the number and identity of buried individuals and to ascertain the cultural significance of the cemetery. If the avoidance of adverse

effects is impossible, SCDAH would be consulted to determine additional mitigative measures (i.e., relocation).

Flight Simulator, MF Pad, AIMD Facility, 3-Module Hangar and Parking Apron, Child Development Center, and Missile Magazines

The construction of these facilities would have no adverse effect on significant archaeological sites. Although the locations of the proposed MF Pad and parking apron correspond to known archaeological sites (38BU1361 and 38BU1364), these sites are not eligible for listing on the NRHP. No mitigative measures are required in these locations.

BEQ (P-411) and BEQ (P-412)

The construction of the proposed BEQs may have an adverse effect on NRHP-eligible Site 38BU927. If site avoidance is not feasible, a mitigation program would be developed and implemented in consultation with the SCDAH. These measures may include site delineation and archaeological data recovery at the impacted locations.

Laurel Bay Family Housing Area

The construction of 240 housing units in the northeastern portion of the Laurel Bay Family Housing Area would not impact Site 38BU1692, a prehistoric site that has been determined to be potentially eligible for listing on the NRHP. The design of the housing units will establish a protective buffer around the site to ensure avoidance.

A currently unknown number of housing units may be constructed within the existing development (i.e., infill). Site 38BU1692 is located within the area of the existing development and has been determined to be potentially significant. Construction of additional housing units as infill would avoid this site.

The extreme northwestern portion of the existing housing development and the undeveloped area north of it contain a large site that has been listed on the NRHP. This site, the Tabby Ruin Site (38BU1421, Laurel Bay Plantation), contains a number of discontinuous, widely scattered structural elements. Construction of additional housing units as infill would avoid this important 19th century plantation.

7.1.13.2 Currently Unknown Cultural Resources

Currently unknown cultural resources (i.e., archaeological sites) may exist in the unsurveyed portions of MCAS Beaufort. Specifically, unknown sites may be extant within the site of the MF Pad and in the unsurveyed northern portion of the proposed runway. A

Phase I/II archaeological survey would be undertaken prior to construction to identify such sites and evaluate their significance. Furthermore, the final design for placement of various infrastructure elements (subsurface utilities) has not been completed. The position of subsurface trenches must be correlated to known sites to ensure avoidance of these sites.

7.1.13.3 Architectural Resources

The proposed construction projects associated with ARS 4 would result in demolition of 22 housing units in the Pine Grove Housing Area and 34 buildings and structures under the footprint of the proposed runway. Building 729 (hangar) and Merritt Field (the existing runway) would undergo alterations that may diminish their architectural integrity and historical value. It has not yet been determined whether any of these buildings or structures are eligible for listing on the NRHP. MCAS Beaufort is currently updating its Historic Preservation Plan, which would assess the significance of these and other facilities at MCAS Beaufort. Prior to any demolition or alteration of buildings or structures under ARS 4, the historical significance of the building/structure would be determined in consultation with the South Carolina SHPO.

7.1.14 Environmental Contamination

7.1.14.1 Hazardous Materials and Waste Management

With the addition of five F/A-18 fleet squadrons at MCAS Beaufort under ARS 4, it is projected that more hazardous waste would be generated at the station. It is estimated that the hazardous waste generation would increase by 19,000 lbs., an 18% increase over the total hazardous waste generated in 1995. This increase can be accommodated within existing hazardous waste management systems.

7.1.14.2 Installation Restoration Program Sites

No IRP sites would be affected by the proposed construction and operations associated with ARS 4.

7.2 Environmental Consequences and Mitigation Measures: ARS 4 at NAS Oceana

7.2.1 Airfield Operations

Airfield operations at NAS Oceana under ARS 4 would be less than those experienced under ARS 1, 2, 3, or 5. Table 7.2-1 presents projected airfield operations for ARS 4, derived from the NASMOD analysis for the station (ATAC 1997). A total of 209,708 annual operations would be conducted at NAS Oceana. This represents a 93% increase over 1997 operations. At NALF Fentress, projected operations would increase to 145,660, a 39% increase over 1997 levels. As with the other ARSs, these operations could be reasonably accommodated at these facilities (ATAC 1997). Total operations at NAS Oceana associated with ARS 4 would be approximately 11% lower than those associated with ARS 1.

7.2.2 Military Training Areas

7.2.2.1 Military Training Routes

Aircraft operations in MTRs under ARS 4 would be the lowest among all the ARSs. Projected operations and noise levels in Ldnmr associated with ARS 4 are presented in Table 7.2-2. Operations along all MTRs would total 8,598, representing a 10% increase over 1997 levels (ATAC 1997; Wyle Labs 1997). Projected noise levels for ARS 4 would be similar to those for ARS 1.

7.2.2.2 Warning Areas

Aircraft operations in warning areas adjacent to NAS Oceana under ARS 4 would be slightly less than under ARSs 1, 2, and 3 and similar to ARS 5 (see Table 7.2-3). As under the other ARSs, the overall operational efficiency of these airspace components would not be impacted by implementation of ARS 4 (ATAC 1997).

7.2.2.3 Military Operating Areas

Aircraft operations in the Stumpy Point MOA under ARS 4 would be similar to current operations (see Table 7.2-4).

Table 7.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 4

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
NAS Oceana						
F-14 Fleet	Departure	13,225	12,155	1,123	13,278	
	Full Stop Visual Landing	12,700	11,279	1,456	12,735	
	Full Stop Instrument Landing	514	383	150	533	
	Visual Touch-and-Go/Low Approach	20,396	19,656	996	20,652	
	Instrument Touch-and-Go/Low Approach	570	522	44	566	
	Field Carrier Landing Practice	0	480	160	640	
	TOTAL	**47,405**	**44,475**	**3,929**	**48,404**	
F-14 FRS	Departure	6,947	6,511	455	6,966	
	Full Stop Visual Landing	6,308	5,896	428	6,324	
	Full Stop Instrument Landing	639	260	382	642	
	Visual Touch-and-Go/Low Approach	27,456	25,420	964	26,384	
	Instrument Touch-and-Go/Low Approach	5,234	3,670	1,598	5,268	
	Field Carrier Landing Practice	0	360	0	360	
	TOTAL	**46,584**	**42,117**	**3,827**	**45,944**	
F/A-18 Fleet	Departure	0	8,285	719	9,004	
	Full Stop Visual Landing	0	7,424	988	8,412	
	Full Stop Instrument Landing	0	453	151	604	
	Visual Touch-and-Go/Low Approach	0	14,538	876	15,414	
	Instrument Touch-and-Go/Low Approach	0	1,314	316	1,630	
	Field Carrier Landing Practice	0	380	600	980	
	TOTAL	**0**	**32,394**	**3,650**	**36,044**	

Table 7.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 4

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
F/A-18 FRS	Departure	0	8,113	421	8.534	
	Full Stop Visual Landing	0	6,910	679	7,589	
	Full Stop Instrument Landing	0	666	279	945	
	Visual Touch-and-Go/Low Approach	0	36,446	2,344	38,790	
	Instrument Touch-and-Go/Low Approach	0	4,498	570	5,068	
	Field Carrier Landing Practice	0	240	80	320	
	TOTAL	0	56,873	4,373	61,246	
Adversary	Departure	839	1,799	51	1,850	
	Full Stop Visual Landing	828	1,837	0	1,837	
	Full Stop Instrument Landing	5	11	2	13	
	Visual Touch-and-Go/Low Approach	436	1,514	0	1,514	
	Instrument Touch-and-Go/Low Approach	168	168	0	168	
	TOTAL	2,276	5,329	53	5,382	
Transient Jet	Departure	967	947	20	967	
	Full Stop Visual Landing	724	708	14	722	
	Full Stop Instrument Landing	243	243	2	245	
	Visual Touch-and-Go/Low Approach	1,078	1,024	28	1,052	
	Instrument Touch-and-Go/Low Approach	836	800	30	830	
	TOTAL	3,848	3,722	94	3,816	
Transient Prop	Departure	1,642	1,645	32	1,677	
	Full Stop Visual Landing	1,171	1,186	16	1,202	
	Full Stop Instrument Landing	471	467	8	475	
	Visual Touch-and-Go/Low Approach	2,890	2,858	52	2,910	

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Table 7.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 4

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations: Day 0700-2200	Projected 1999 Airfield Operations: Night 2200-0700	Projected 1999 Airfield Operations: Total	Percent Change
	Instrument Touch-and-Go/Low Approach	2,610	2,566	42	2,608	
	TOTAL	8,784	8,722	150	8,872	
	AIRFIELD TOTAL	108,897	250,505	20,449	270,954	93
NALF Fentress						
F-14 Fleet	Field Carrier Landing Practice	38,640	21,027	17,053	38,080	
F-14 FRS	Field Carrier Landing Practice	23,280	13,679	9,601	23,280	
F/A-18 Fleet	Field Carrier Landing Practice	0	10,740	6,540	17,280	
F/A-18 FRS	Field Carrier Landing Practice	0	17,848	6,424	24,272	
E-2 Fleet	Departure	168	0	0	0	
	Full Stop Visual Landing	168	0	0	0	
	Field Carrier Landing Practice	16,464	8,472	8,328	16,800	
E-2 FRS	Departure	616	0	0	0	
	Full Stop Visual Landing	616	0	0	0	
	Field Carrier Landing Practice	16,368	10,307	7,293	17,600	
C-2 Fleet	Departure	112	0	0	0	
	Full Stop Visual Landing	112	0	0	0	
	Field Carrier Landing Practice	8,124	7,795	553	8,348	
	AIRFIELD TOTAL	104,668	89,868	55,792	145,660	39

Source: ATAC 1997.

Table 7.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 4

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 4			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
VR-0073	A-6	5	0	0	0		52	53
	AV-8B	199	511	14	525			
	EA-6B	39	38	1	39			
	F-14	61	28	0	28			
	F-15	601	589	12	601			
	F-16	72	72	0	72			
	F/A-18	6	6	0	6			
	T-38	4	4	0	4			
	Total	**987**	**1,248**	**27**	**1,275**	**29**		
VR-0085	AV-8B	0	30	1	31		<50	<50
	F-14	50	128	0	128			
	F-15	464	464	0	464			
	F-16	19	19	0	19			
	F/A-18	11	58	0	58			
	EA-6B	0	83	0	83			
	KC-130	0	32	0	32			
	Total	**544**	**814**	**1**	**815**	**49**		
VR-1040	A-10	9	9	0	9		52	52
	AV-8B	101	30	1	31			
	KC-130	28	32	0	32			
	EA-6B	78	83	0	83			
	F-14	0	128	0	128			
	F-16	520	520	0	520			
	F/A-18	18	58	0	58			
	Total	**754**	**860**	**1**	**861**	**14**		
VR-1043	A-6	405	0	0	0		55	<50
	AV-8B	64	21	0	21			

Table 7.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 4

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 4			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	KC-130	32	32	0	32			
	EA-6B	74	74	0	74			
	F-15	28	28	0	28			
	F-16	115	115	0	115			
	F/A-18	37	37	0	37			
	Total	**755**	**307**	**0**	**307**	-59		
VR-1046	A-10	9	9	0	9		57	50
	A-6	363	0	0	0			
	AV-8	78	267	4	271			
	EA-6B	37	21	16	37			
	F-15	41	41	0	41			
	F-16	9	9	0	9			
	F/A-18	92	184	2	186			
	F-4	9	9	0	9			
	T-2	4	4	0	4			
	Total	**642**	**544**	**22**	**566**	-12		
VR-1752	A-4	5	5	0	5		50	<50
	A-6	179	0	0	0			
	AV-8B	6	30	1	31			
	C-17	1	1	0	1			
	KC-130	10	32	0	32			
	EA-6B	167	83	0	83			
	F-111	5	5	0	5			
	F-14	19	128	0	128			
	F-15	191	183	8	191			
	F-16	3	3	0	3			
	F/A-18	23	58	0	58			

Table 7.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 4

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 4			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	TA-4	3	3	0	3			
	Total	612	531	9	540	-11		
VR-1753	A-6	418	0	0	0		51	51
	AV-8B	34	32	2	34			
	C-2	7	7	0	7			
	EA-6B	27	25	2	27			
	F-14	280	1,042	2	1,044			
	F-15	144	142	2	144			
	F-16	174	170	4	174			
	F/A-18	8	433	51	484			
	S-3	2	2	0	2			
	Total	1,094	1,853	63	1,916	75		
VR-1754	A-6	134	0	0	0		<50	<50
	CH-53	7	7	0	7			
	EA-6B	69	83	0	83			
	F-14	31	128	0	128			
	F-15	81	75	6	81			
	F-16	3	3	0	3			
	F/A-18	125	58	0	58			
	AV-8B	0	30	1	31			
	KC-130	0	32	0	32			
	Total	450	416	7	423	-6		
VR-1758	A-4	10	10	0	10		56	53
	A-6	448	0	0	0			
	AV-8B	22	30	1	31			
	B-1	7	7	0	7			
	B-52	1	1	0	1			

Table 7.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 4

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 4			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	EA-6B	139	83	0	83			
	F-14	125	128	0	128			
	F-15	188	184	4	188			
	F-16	8	8	0	8			
	F/A-18	14	58	0	58			
	KC-130	0	32	0	32			
	Total	**962**	**541**	**5**	**546**	**-43**		
VR-1759	A-6	114	0	0	0		<50	<50
	AV-8B	17	30	1	31			
	EA-6B	11	83	0	83			
	F-14	27	128	0	128			
	F-15	9	9	0	9			
	F/A-18	3	58	0	58			
	KC-130	0	32	0	32			
	Total	**181**	**340**	**1**	**341**	**88**		
VR-1074	A-6	17	0	0	0		52	51
	AV-8B	196	317	0	317			
	EA-6B	34	34	0	34			
	F-14	8	8	0	8			
	F-15	403	403	0	403			
	F-16	12	12	0	12			
	F/A-18	16	16	0	16			
	Total	**686**	**790**	**0**	**790**	**15**		

Table 7.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 4

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 4			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
IR-0714	A-6	74	0	0	0		<50	<50
	EA-6B	99	17	82	99			
	F/A-18	0	112	7	119			
	Total	173	129	89	218	26		
Total All MTRs		7,840	8,373	225	8,598	10	NA	NA

Source: ATAC 1997; Wyle Labs 1997.

Table 7.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS AND MILITARY OPERATING AREAS
ARS 4

User/Service Category	1997 Sorties Day (0700 - 2200)	1997 Sorties Night (2200 - 0700)	1997 Sorties Total	Projected 1999 Sorties (ARS 4) Day (0700 - 2200)	Projected 1999 Sorties (ARS 4) Night (2200 - 0700)	Projected 1999 Sorties (ARS 4) Total	Percent Change (Total)
TACTS Range							
F-14 (NAS Oceana Fleet)	2,869	47	2,916	2,238	33	2,271	
F-14 (NAS Oceana FRS)	543	0	543	546	0	546	
F/A-18 (NAS Oceana Fleet)	0	0	0	2,153	11	2,164	
F/A-18 (NAS Oceana FRS)	0	0	0	165	0	165	
Adversary Aircraft	612	14	626	1,311	15	1,326	
Air Force Jets	704	11	715	498	22	520	
Total	**4,728**	**72**	**4,800**	**6,911**	**81**	**6,992**	**46**
W-72 (exclusive of TACTS Range)							
F-14 (NAS Oceana Fleet)	2,942	58	3,000	3,536	65	3,601	
F-14 (NAS Oceana FRS)	2,739	0	2,739	2,796	0	2,796	
F/A-18 (NAS Oceana Fleet)	0	0	0	2,810	64	2,874	
F/A-18 (NAS Oceana FRS)	0	0	0	4,518	61	4,579	
F/A-18 (Marine Corps)	75	0	75	75	0	75	
KC-130 (MCAS Cherry Point FRS)	4	0	4	4	0	4	
Adversary Aircraft	121	0	121	494	0	494	
Other Navy Aircraft	2,771	204	2,975	2,771	204	2,975	
Air Force Jets	1,323	0	1,323	1,327	0	1,327	
Other Air Force Aircraft	69	41	110	69	41	110	
Coast Guard Aircraft	46	33	79	46	33	79	
Contractor	876	0	876	876	0	876	
Civilian	34	37	71	34	37	71	
Total	**11,000**	**373**	**11,373**	**19,356**	**505**	**19,861**	**75**
W-386 A/B							
F-14 (NAS Oceana Fleet)	0	0	0	148	0	148	
F-14 (NAS Oceana FRS)	14	0	14	7	0	7	
F/A-18 (NAS Oceana Fleet)	0	0	0	86	0	86	
F/A-18 (NAS Ocean Fleet)	0	0	0	86	0	86	
F/A-18 (NAS Oceana FRS)	0	0	0	18	0	18	
F/A-18 (Marine Corps)	15	0	15	15	0	15	
Other Navy Aircraft	360	199	559	360	199	559	

Table 7.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS AND MILITARY OPERATING AREAS
ARS 4

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 4)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
Air Force Jets	3,308	0	3,308	3,442	0	3,442	
Other Air Force Aircraft	75	24	99	75	24	99	
Coast Guard Aircraft	17	2	19	17	2	19	
NASA (missile launches)	183	0	183	183	0	183	
Contractor	7	4	11	7	4	11	
Civilian	129	27	156	129	27	156	
Total	**4,094**	**256**	**4,364**	**4,246**	**256**	**4,743**	**9**
W-386 D							
F-14 (NAS Oceana Fleet)	275	5	280	325	4	329	
F-14 (NAS Oceana FRS)	684	0	684	684	0	684	
F/A-18 (NAS Oceana Fleet)	0	0	0	111	0	111	
Adversary Aircraft	0	0	0	0	0	0	
Air Force Jets	3	0	3	54	0	54	
NASA (missile launches)	183	0	183	183	0	183	
Total	**1,145**	**5**	**1,150**	**1,357**	**4**	**1,361**	**18**
W-122							
F-14 (NAS Oceana Fleet)	718	44	762	485	30	515	
F-14 (NAS Oceana FRS)	123	0	123	107	0	107	
F/A-18 (NAS Oceana Fleet)	0	0	0	279	4	283	
Adversary Aircraft	0	0	0	0	0	0	
F/A-18 (Marine Corps)	551	68	619	548	69	617	
AV-8 (Cherry Point Fleet)	2,130	32	2,162	2,123	33	2,156	
AV-8 (MCAS Cherry Point FRS)	1,316	0	1,316	1,314	0	1,314	
EA-6B (MCAS Cherry Point Fleet)	1,606	15	1,621	1,605	16	1,621	
KC-130 (MCAS Cherry Point Fleet)	144	0	144	144	0	144	
KC-130 (MCAS Cherry Point FRS)	231	0	231	231	0	231	
Other Navy Aircraft	452	184	636	451	185	636	
Air Force Jets	4,852	573	5,425	4,865	563	5,428	
Other Air Force Aircraft	270	60	330	270	60	330	

Table 7.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS AND MILITARY OPERATING AREAS ARS 4

User/Service Category	1997 Sorties Day (0700 - 2200)	1997 Sorties Night (2200 - 0700)	1997 Sorties Total	Projected 1999 Sorties (ARS 4) Day (0700 - 2200)	Projected 1999 Sorties (ARS 4) Night (2200 - 0700)	Projected 1999 Sorties (ARS 4) Total	Percent Change (Total)
Coast Guard Aircraft	40	4	44	40	4	44	
Contractor	34	9	43	34	9	43	
Civilian	774	63	837	774	63	837	
Total	**13,241**	**1,052**	**14,293**	**13,270**	**1,036**	**14,306**	**<1**

Source: ATAC 1997.

Table 7.2-4

PROJECTED 1999 SORTIES IN THE STUMPY POINT MILITARY OPERATING AREA ARS 4

User/Service Category	1997 Total	Projected 1999 Operations			Percent Change
		Day (0700-2200)	Night (2200-0700)	Total	
F-14 (NAS Oceana Fleet)	56	44	2	46	
F/A-18	0	12	0	12	
Total	56	56	2	58	4

Key:

NAS = Naval Air Station.

Source: ATAC 1997.

7.2.2.4 Restricted Areas

Aircraft operations in restricted areas adjacent to NAS Oceana under ARS 4 would differ slightly from those under ARSs 1, 2, 3, and 5 (see Table 7.2-5). Noise levels in these areas would remain relatively constant. As under the other ARSs, the overall operational efficiency of these areas would not be impacted by implementation of ARS 4 (ATAC 1997).

7.2.3 Target Ranges

Projected sorties and noise levels in BT-9, BT-11, and the Dare County Range are presented in Table 7.2-6. With the exception of BT-9, which would have a noise level 3 dB higher (i.e., Ldnmr of 63 dB) than in 1997, no significant changes in projected noise levels would occur under ARS 4 as compared to ARS 1.

7.2.3.1 BT-9 (Brant Island Shoal)

Projected operations and utilization rates at BT-9 under ARS 4 would be lower under ARS 1.

Land Use

The impacts of ARS 4 would be similar to those of ARS 1 (see Section 4.3.1).

Table 7.2-5

PROJECTED 1999 RESTRICTED AREA SORTIES AND NOISE LEVELS
ARS 4

Restricted Area	Aircraft Type	1997 Sorties	Projected 1999 Sorties - ARS 4			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
			Day (0700-2200)	Night (2200-0700)	Total			
R-5306A (exclusive of BT-9 and BT-11)	A-10	30	30	0	30		<50	<50
	AH-1	136	136	0	136			
	AV-8B (Fleet)	1,021	1,052	32	1,084			
	AV-8B (FRS)	1,553	1,552	2	1,554			
	EA-6B	288	278	10	288			
	F/A-18 (Marine Corps)	91	91	0	91			
	F-15	56	56	0	56			
	F-16	212	208	4	212			
	F-16 (Air National Guard)	26	26	0	26			
	Other Jet	35	35	0	35			
	Other Prop	90	90	0	90			
	Total	**3,538**	**3,554**	**48**	**3,602**	**2**		
R-5306D	F18	306	307	0	307			
	AH-1	165	160	5	165			
	UH-1	305	300	5	305			
	CH-46	3,360	3,255	105	3,360			
	CH-53	1,370	1,300	70	1,370			
	AV-8B (Fleet)	562	572	4	576		54	54
	KC-130 (Fleet)	22	22	0	22			
	KC-130 (FRS)	34	34	0	34			
	Total	**6,124**	**5,950**	**189**	**6,139**	**<1**		

Sources: ATAC 1997; Wyle Labs 1997.

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Table 7.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 4

Range	Aircraft Type	1997 Sorties			ARS 4 Sorties			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
BT-9	A-10	110	0	110	108	0	108		60	63
	AH-1	78	0	78	86	0	86			
	AV-8B (Fleet)	246	6	252	214	18	232			
	AV-8B (FRS)	25	0	25	33	0	33			
	EA-6B	13	0	13	13	0	13			
	CH-46	75	0	75	75	0	75			
	CH-53	9	2	11	11	0	11			
	F-14 (NAS Oceana Fleet)	68	0	68	170	4	174			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	52	0	52	80	4	84			
	F-16	380	8	388	360	8	368			
	F/A-18 (NAS Oceana Fleet)	0	0	0	138	4	142			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	190	10	200	212	8	220			
	H/UH-1	29	0	29	31	0	31			
	Army Helicopters[a]	74	8	82	82	8	90			
	Other Jet[b]	43	0	43	37	0	37			
	Other Prop[c]	20	0	20	19	0	19			
	Total BT-9	**1,679**	**62**	**1,741**	**1,936**	**82**	**2,018**	16		
BT-11	A-10	120	0	120	126	0	126		68	69
	EA-6B	13	0	13	13	0	13			
	AH-1	107	0	107	99	0	99			

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Table 7.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 4

Range	Aircraft Type	1997 Sorties			ARS 4 Sorties			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
	AV-8B (Fleet)	1,162	36	1,198	1,106	28	1,134			
	AV-8B (FRS)	720	0	720	713	0	713			
	KC-130 (MCAS Cherry Point Fleet)	18	0	18	18	0	18			
	CH-46	123	0	123	123	0	123			
	CH-53	13	2	15	11	4	15			
	F-14 (NAS Oceana Fleet)	494	2	496	626	4	630			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	400	6	406	374	12	386			
	F-16	388	0	388	390	0	390			
	F-16 (Air National Guard)	198	0	198	218	12	230			
	F/A-18 (NAS Oceana Fleet)	0	0	0	794	16	810			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	362	22	384	340	24	364			
	H/UH-1	43	0	43	41	0	41			
	Army Helicopters[a]	80	8	88	80	0	80			
	Other Jet[b]	14	3	17	23	0	23			
	Other Prop[c]	17	0	17	18	0	18			
	Total BT-11	4,539	107	4,646	5,380	128	5,508	19		

Table 7.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 4

Range	Aircraft Type	1997 Sorties			ARS 4 Sorties			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
Dare County Range	A-10	14	0	14	10	0	10		65	65
	AV-8B (Fleet)	68	0	68	62	0	62			
	AV-8B (FRS)	10	0	10	8	0	8			
	EA-6B	5	0	5	5	0	5			
	F-14 (NAS Oceana Fleet)	2,986	38	3,024	2,700	54	2,754			
	F-14 (NAS Oceana FRS)	1,027	0	1,027	995	0	995			
	F-14 (Other Navy)	9	0	9	9	0	9			
	F-15	156	4	160	140	8	148			
	F-16	346	4	350	366	2	368			
	F-16 (Air National Guard)	498	26	524	488	6	494			
	F/A-18 (NAS Oceana Fleet)	0	0	0	874	86	960			
	F/A-18 (NAS Oceana FRS)	0	0	0	550	106	656			
	F/A-18 (Adversary)	12	0	12	19	0	19			
	F/A-18 (Other Navy)	53	0	53	53	0	53			
	F/A-18 (Marine Corps)	26	6	32	24	8	32			
	T-34	0	0	0	35	0	35			
	F-15	1,305	102	1,407	1,305	102	1,407			
	F-16	401	4	405	401	4	405			
	A-10	44	0	44	44	0	44			
	AV-8B	81	0	81	81	0	81			
	EA-6B	1	0	1	1	0	1			
	F-14	63	0	63	63	0	63			

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Table 7.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 4

Range	Aircraft Type	1997 Sorties			ARS 4 Sorties			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
	F/A-18	1	0	1	1	0	1			
	OA-10	7	0	7	7	0	7			
	Total Dare County Range	7,113	184	7,297	8,241	376	8,617	18		

a Modeled as AH-64.
b Modeled as F/A-18.
c Modeled as KC-130.

Source: ATAC 1997; Wyle Labs 1997.

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Water Quality

The impacts of ARS 4 would be similar to those of ARS 1 (see Section 4.3.1).

Aquatic Resources

The impacts of ARS 4 would be similar to those of ARS 1 (see Section 4.3.1).

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 7.2-7. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 7.2-7. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases would be less than 0.1 ton per year and would not affect air quality in the area.

7.2.3.2 BT-11 (Piney Island)

Projected aircraft operations and utilization rates at BT-11 under ARS 4 would be 46%, slightly less than under ARSs 1, 2, 3, and 5. Projected operations could be accommodated within published operating hours of the range.

Land Use

Land use impacts under ARS 4 would be similar to those under ARS 1 (see Section 4.3.2).

Water Quality

Impacts under ARS 4 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Aquatic Resources

Impacts under ARS 4 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Terrestrial Resources

Impacts under ARS 4 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Table 7.2-7

PROJECTED EMISSIONS - BT-9 ARS 4

Aircraft Type	Annual Operations Below 3,000 ft.[a]	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	12	0.0008	0.0201	0.0024	0.0005	0.0046
F/A-18	31	0.0083	0.0403	0.0207	0.0009	0.01
AV-8	252	0.0191	0.1415	0.137	0.0068	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10[b]	108	0.0066	0.0171	0.0534	0.0015	0.0077
F-16	22	0.0002	0.0261	0.0027	0.0004	0.0005
F-15	5	0.0001	0.060	0.0006	0.0001	0.0001
All Helicopters[c]	293	0.1012	0.2434	0.9677	0.0323	0.0000
Other Jets	19	0.0011	0.0004	0.0085	0.0001	0.0009
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**752**	**0.1401**	**0.4980**	**1.1979**	**0.0428**	**0.0237**
Net Change from 1997	**17**	**0.0076**	**0.0299**	**0.0575**	**0.0022**	**0.0047**

[a] Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
[b] Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
[c] Assumed all helicopter operations are below 3,000 ft.

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 7.2-8. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 7.2-8. Emissions of VOC, NO_x and PM_{10} would increase slightly, while emissions of CO and SO_2 would decrease slightly. Although there would be a very small decrease in total annual operation below 3,000 feet (914 meters) AGL, individual aircraft models emit the majority of the VOC, NO_x and PM_{10} would operate more frequently than in the existing condition, thus the net change for these pollutants would be slightly greater than zero. All emission increases would be less than 0.1 ton per year and would not affect air quality in the area.

7.2.3.3 Dare County Range

Projected aircraft operations and utilization rates at the Dare County Range (63%) would be slightly less under ARS 4 than under ARS 1, 2, 3, or 5. These operations could be conducted within published operating hours.

Land Use

Land use impacts under ARS 4 would be similar to those under ARS 1 (see Section 4.3.3).

Water Quality

Impacts under ARS 4 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Aquatic Resources

Impacts under ARS 4 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Terrestrial Resources

Impacts under ARS 4 would be similar or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Table 7.2-8

PROJECTED EMISSIONS - BT-11 ARS 4

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	40	0.0027	0.0650	0.0078	0.0017	0.0150
F/A-18	72	0.0191	0.0925	0.0474	0.0020	0.0229
AV-8	1,755	0.1328	0.9860	0.9552	0.0477	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	126	0.0077	0.0199	0.0623	0.0017	0.0089
F-16	37	0.0004	0.0439	0.0045	0.0006	0.0008
F-15	23	0.0002	0.0274	0.0028	0.0004	0.0005
All Helicopters	358	0.1237	0.2973	1.1823	0.0395	0.0000
Other Jets	12	0.0007	0.0003	0.0053	0.0001	0.0005
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**2,433**	**0.29**	**1.5356**	**2.2725**	**0.0939**	**0.0487**
Net Change from 1997	**-28**	**0.0003**	**0.0132**	**-0.0641**	**-0.0023**	**0.0162**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all helicopter operations are below 3,000 ft.
KC-130 operations ignored; aircraft not expected to descent below 3,000 ft. AGL because it is an in-flight refueling aircraft.

Air Quality

A slightly different mix of aircraft models use the Dare County range compared to BT-9 and BT-11. Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 7.2-9. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 7.2-9. The slight emission increase for all pollutants would be due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases would be less than 0.1 ton per year and would not affect air quality in the area.

7.2.4 NAS Oceana and NALF Fentress Land Use

The impacts of construction under ARS 4 at NAS Oceana would be similar to those discussed for ARS 1 (see Section 4.4); however they would be of lesser magnitude. As discussed in Section 2, the deficiency of apron space under ARS 4 could be satisfied through expansion of the existing parking apron. This would significantly reduce the level of land disturbance compared to ARS 1, where a three-module aircraft hangar would be necessary.

Figure 7.2-1 depicts projected 1999 noise contours and land use.

Figure 7.2-2 presents the increase between 1978 AICUZ noise contours and projected 1999 noise contours and land use.

With regard to APZs under the AICUZ Program, the impacts associated with ARS 4 would be similar to those described for ARS 1.

7.2.5 Socioeconomics and Community Services

7.2.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

ARS 4 would result in the transfer of approximately 3,000 personnel (450 officers, 2,450 enlisted personnel, and 100 civilians) to NAS Oceana.

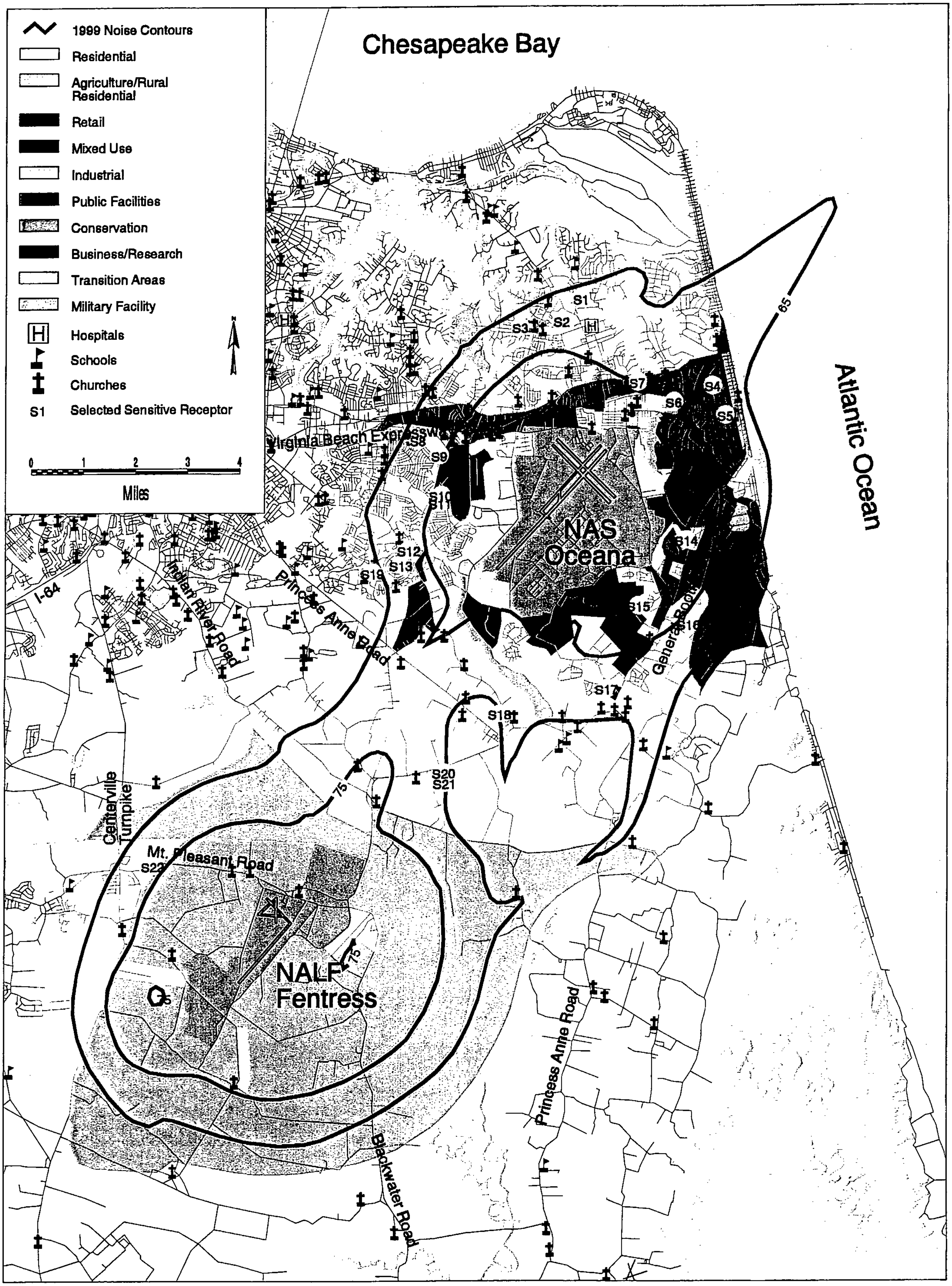
As described for previous ARSs, other actions that have or will occur at NAS Oceana will affect the total personnel loading figures at the station. Table 7.2-10 provides details of the expected personnel movements between FY 1996 and FY 1999. ARS 4, in conjunction with the other ongoing and planned personnel movements, would result in a net increase of 4,400 military and civilian personnel at NAS Oceana over the FY 1996 base population of 8,100 personnel.

Table 7.2-9

PROJECTED EMISSIONS - DARE COUNTY RANGE ARS 4

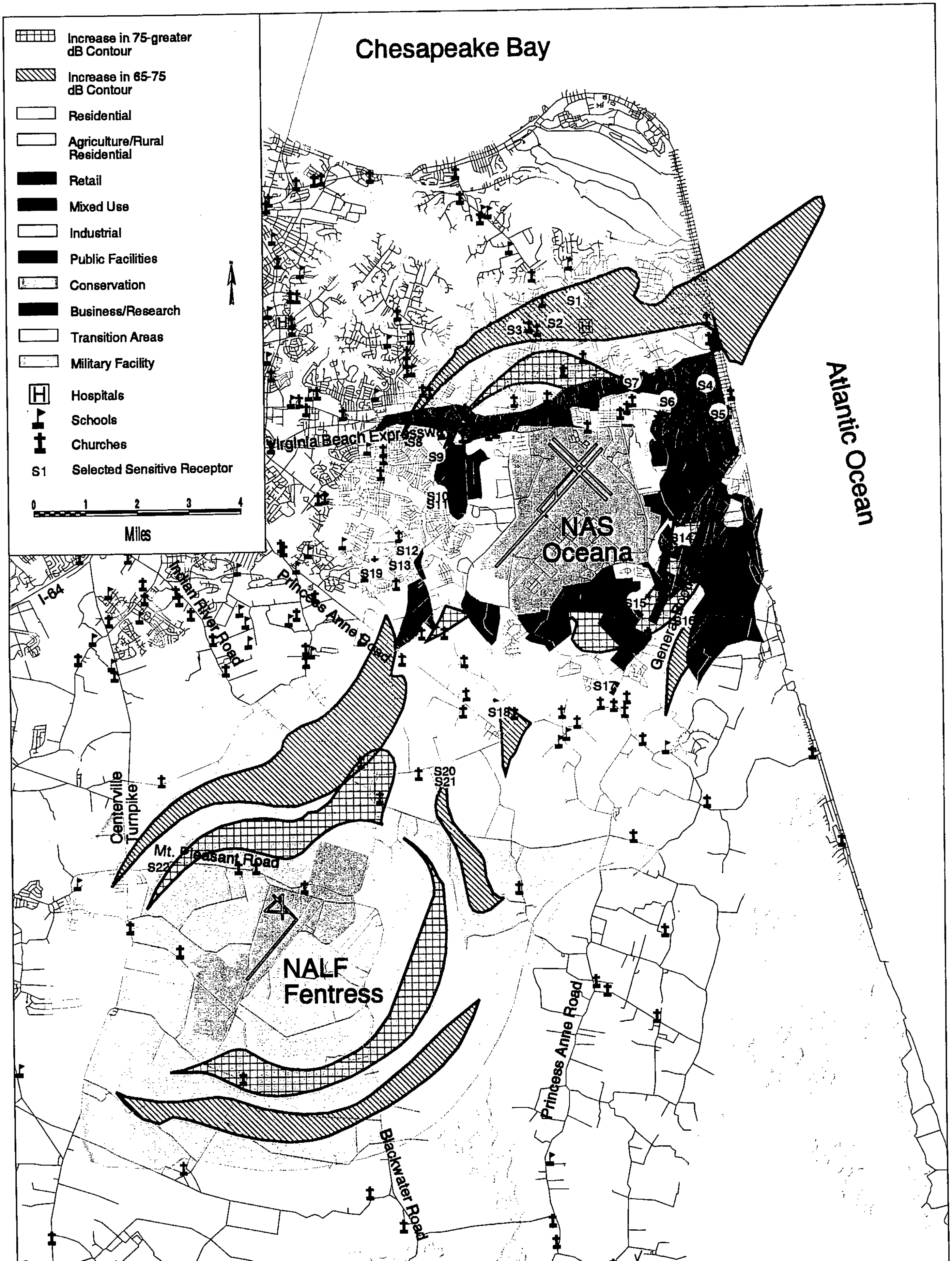
Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	225	0.0155	0.3700	0.0443	0.0099	0.0853
F/A-18	86	0.0229	0.1106	0.0567	0.0024	0.0274
AV-8	67	0.0050	0.0374	0.0362	0.0018	0.0000
EA-6B	4	0.0010	0.0012	0.0019	0.0001	0.0000
A-10	10	0.0006	0.0016	0.0049	0.0001	0.0007
F-16	52	0.0005	0.0611	0.0063	0.0009	0.0012
F-15	9	0.0001	0.0105	0.0011	0.0002	0.0002
Total	**454**	**0.0457**	**0.5924**	**0.1514**	**0.0154**	**0.1147**
Net Change from 1997	**52**	**0.0195**	**0.068**	**0.0437**	**0.0012**	**0.0187**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.



Source: City of VA Beach 1991
City of Chesapeake 1993
Wyle Labs 1997

Figure 7.2-1
ARS 4 - Projected 1999 Noise Contours and Land Use
NAS Oceana



Source: U.S. Navy 1978; Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

Figure 7.2-2

ARS 4 - Increase Between 1978 AICUZ Noise Contours and Projected 1999 Noise Contours and Land Use NAS Oceana

Table 7.2-10

PROJECTED PERSONNEL LOADING AT NAS OCEANA UNDER ARS 4

	FY 1996	FY 1997	FY 1998	FY 1999
Personnel at beginning of FY	8,100	8,800	9,500	12,500
A-6 Decommissioning	-300	-300	NA	NA
A-6 AIMD and ATKWING Support Staff	NA	-100	NA	NA
Realignment of F-14 FRS Detachment[a]	NA	+150	NA	NA
Realignment of F-14 Squadrons[b]	+600	+600	NA	NA
F-14 Support Staff[b]	+400	+50	NA	NA
Transfer of F-14A Aircraft[c]	NA	+300	NA	NA
Realignment of F/A-18 Squadrons[b]	NA	NA	+1,740	
F/A-18 Support Staff			+1,260	
End of Fiscal Year	8,800	9,500	12,500	12,500
Net change from beginning of FY 1996	+700	+1,400	+4,400	+4,400

[a] Result of 1993 BRAC recommendations.
[b] Result of 1995 BRAC recommendations.
[c] Result of action separate from BRAC.

Key:

ATKWING = Attack Wing.
AIMD = Aircraft Intermediate Maintenance Department.
FRS = Fleet Replacement Squadron.
FY = Fiscal Year.
NA = Not applicable.

Source: U.S. Navy 1995a.

Impacts to the demographic characteristics of the City of Virginia Beach and the south Hampton Roads region would be similar to those described for the other alternatives. When various demographic characteristics of the relocating personnel are taken into account (such as martial status, number of dependents, and household size), ARS 4 is expected to increase the total regional population by approximately 9,850 residents. The largest population impact would occur in the City of Virginia Beach, where the total population would increase by nearly 3,300. Table 7.2-11 presents a detailed breakdown of the population impacts of ARS 4.

Economy, Employment, and Income

Similar to the other ARSs, ARS 4 would have a positive impact on the south Hampton Roads economy. As with the other alternatives, additional income would be injected into the local economy via the increase in military and civilian payroll expenditures ($125 million) and via construction programs needed to accommodate the relocating personnel ($68.8 million). The direct and indirect economic impacts of ARS 4 are summarized in Table 7.2-12. As shown, the $68.8 million construction program would generate approximately $20.8 million in employee earnings and create approximately 875 additional jobs in the region.

Housing

The on-station and off-station housing impacts from ARS 4 would be similar to those described for ARS 1.

No significant impact would occur to the BOQ facilities at NAS Oceana as a result of ARS 4. As described for previous ARSs, the relatively small number of officers who would relocate, the ability and preference of most officers to live off-station, and the current number of vacant spaces at NAS Oceana's BOQs would ensure that sufficient capacity exists to house any additional bachelor officers who choose to live on station.

Impacts to Navy family housing would be similar to those described for the other ARSs. The total number of Navy families in the south Hampton Roads region would decrease by 36,500 as a net result of downsizing activities and the proposed realignment activities under this alternative. During the same time period, the actual number of military-controlled family housing units is expected to increase by an estimated 560 units. Therefore, ARS 4 would not have a significant impact on the regional housing market.

Table 7.2-11

NET REGIONAL SOCIOECONOMIC IMPACTS AT NAS OCEANA RESULTING FROM ARS 4[a]

	Virginia Beach	Chesapeake	Norfolk	Portsmouth	Suffolk	Total South Hampton Roads	Other	Total Effects
Population Impacts								
Total military personnel relocating	3,270	410	260	110	40	4,090	310	4,400
Number of military dependents	4,040	510	320	140	50	5,060	390	5,450
Total Population Change	**7,310**	**920**	**580**	**250**	**90**	**9,150**	**700**	**9,850**
Personnel and Regional Housing Impacts								
Total officers relocating	450	60	30	20	10	570	40	610
Total enlisted personnel relocating	2,750	340	220	90	30	3,430	260	3,690
Total civilians relocating	70	10	10	0	0	90	10	100
Total Military Households Relocating	**3,270**	**410**	**260**	**110**	**40**	**4,090**	**310**	**4,400**
Fiscal Impacts								
Total population change	7,310	920	580	250	90	9,150	700	9,850
Local per capita tax contribution	$1,005	$1,128	$1,048	$883	$842	NA	NA	NA
Estimated Change in Local Tax Contributions	**$7,346,550**	**$1,037,760**	**$607,840**	**$220,750**	**$75,780**	**$9,288,680**	**NA**	**NA**
Education Impacts								
Total elementary school-age children	1,050	130	80	30	10	1,310	110	1,420
Total middle school-age children	310	40	20	10	10	390	30	420
Total high school-age children	210	30	20	10	0	260	20	280
Total Number of School-age Children	**1,570**	**200**	**120**	**50**	**20**	**1,960**	**160**	**2,120**

a Includes relocations for ARS 4 and other relocations occuring at NAS Oceana.

Note: Totals may not add due to rounding.

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Table 7.2-12

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF 11 F/A-18 FLEET SQUADRONS TO NAS OCEANA UNDER ARS 4

Impact	
Direct Economic Impacts	
Increase in Military and Civilian Payroll	$125,000,000
Construction Expenditures	$68,826,000
Total	$193,789,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$20,789,000
Employment Impacts (jobs)	875

[a] Indirect economic impacts have only been calculated for construction expenditures.

Taxes and Revenues

The fiscal impacts associated with implementing ARS 4 would be similar to those described for ARS 1. The only difference between the two alternatives would be the total number of new residents relocating to the affected municipalities. For example, ARS 4 would cause 7,310 new residents to move to the City of Virginia Beach who would, in turn, generate approximately $7.3 million in additional tax revenues. Table 7.2-11 provides details on the estimated increase in local tax revenues, by municipality, that would result from implementation of ARS 4.

As described previously, local government expenditures would also increase as a result of the influx of new residents to the area. Local government expenditures, particularly on education, would increase. However, as described in ARS 1, most negative fiscal impacts would be offset by the increase in economic activity, local tax receipts, and a possible increase in federal impact aid. No significant negative fiscal impacts would occur as a result of ARS 4.

7.2.5.2 Community Services

The impacts of ARS 4 on community services would be similar to those described for ARS 1; however, they would be of lesser magnitude. No significant impacts to community services at or around NAS Oceana would occur as a result of ARS 4.

7.2.6 Infrastructure

7.2.6.1 Water Supply

ARS 4 would result in impacts similar to or lesser than those discussed in Section 4.6.1. Specifically, ARS 4 would result in a net increase of approximately 4,400 personnel at NAS Oceana by the end of 1999. Using the same assumptions used for ARS 1, this would result in a net daily increase in water consumption at NAS Oceana of 0.06 MGD.

Regionally, the net increase of 4,400 personnel at NAS Oceana under ARS 4 would result in a total increase of approximately 9,850 persons (with dependents) to the south Hampton Roads region. Based on assumptions used for ARS 1, this would result in a daily increase of 0.66 MGD in water consumption in the City of Virginia Beach. In the City of Chesapeake, water consumption would increase by 0.06 MGD.

7.2.6.2 Wastewater System

The impacts of ARS 4 on wastewater systems would be slightly less than those described for ARS 1 (see Section 4.6.2). No significant adverse impacts to wastewater systems would occur under ARS 4.

7.2.6.3 Stormwater

The impacts of ARS 4 on stormwater systems at NAS Oceana would be less than those described for ARS 1 (see Section 4.6.3), primarily because, under ARS 4, the parking apron expansion would be smaller than for ARS 1 and the three-module hangar would not be required.

7.2.6.4 Electrical

The impacts of ARS 4 on electrical systems at NAS Oceana would be similar to those described for ARS 1 (see Section 4.6.4).

7.2.6.5 Heating

The impacts of ARS 4 on heating systems at NAS Oceana would be similar to those described for ARS 1 (see Section 4.6.5).

7.2.6.6 Jet Fuel

The impacts of ARS 4 on jet fuel facilities at NAS Oceana would be similar to those described for ARS 1 (see Section 4.6.6).

7.2.6.7 Solid Waste Management

The impacts of ARS 4 on solid waste generation at NAS Oceana would be slightly less than those described for ARS 1 (see Section 4.6.7). No significant adverse impacts to regional landfill facilities would occur under ARS 4.

7.2.7 Transportation

The impacts of ARS 4 on roadways in the vicinity of NAS Oceana would be slightly less than those of ARS 1. Table 7.2-13 and Figure 7.2-3 compare projected traffic on roadways in the vicinity of the station under ARS 4 to the projected traffic that would occur without the proposed realignment.

7.2.7.1 Regional Road Network

As under ARS 1, Virginia Beach Boulevard between First Colonial and Princess Anne would decrease in LOS from C to D. A section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F, which would be considered a significant impact. Some roadways in the study area would continue to operate at an unacceptable LOS; however, these are the result of existing traffic and overall projected growth in the region. Although ARS 4 would result in additional traffic on these thoroughfares, actual impact on transportation would be, in most cases, negligible because the influx of traffic would be small relative to the existing traffic flows. Planned regional road improvements (see Section 3.1.7) and personnel reductions associated with the decommissioning of A-6 squadrons would reduce the impact. Furthermore, planned roadway improvements, specifically the expansion of Oceana Boulevard, would provide additional capacity on the regional transportation network.

7.2.7.2 Station Road Network

As shown in Table 7.2-13, the most significant increases in traffic volume would be on station roadways. As under ARS 1, a portion of Princess Anne Road, which runs from the main gate centrally through the station, would experience an LOS degradation from C to D. In addition, as under ARS 1, intersections on station would experience a degradation of overall LOS under ARS 4.

7.2.7.3 Planned Road Improvements

As under ARS 1, traffic projected for ARS 4 would not significantly affect the feasibility of any proposed road improvements in the region.

Table 7.2-13

PROJECTED TRAFFIC CONDITIONS UNDER ARS 4 FOLLOWING REALIGNMENT AT NAS OCEANA (Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Princess Anne Road (on base)	21,379	C	24,376	D	2,997
Princess Anne Road (on base)- NASO Main Gate to Oceana Blvd.	13,745	C	16,742	C	2,997
London Bridge Road (on base)	9,591	C	12,404	C	2,813
Harpers Road - Dam Neck to London Bridge	2,295	C	2,434	C	139
Oceana Boulevard - Virginia Beach Blvd. to Bells	23,070	D	23,859	D	789
Oceana Boulevard - Bells to Princess Anne (NASO)	29,017	E	30,094	F	1,077
Oceana Boulevard - Princess Anne (NASO) to Harpers	30,227	F	30,321	F	94
Oceana Boulevard - Harpers to Flicker Way	27,862	F	27,924	D	65
Oceana Boulevard - Flicker Way to General Booth	42,876	F	42,935	F	59
First Colonial Road - Base Boundary to Indiana Avenue	1,737	C	1,741	C	4
First Colonial - Indiana to Virginia Beach Blvd.	14,788	C	15,146	C	358
First Colonial - Virginia Beach Boulevard to Expressway	25,808	D	26,012	D	204
London Bridge Road - Swamp Rd. to Shipps Corner	15,184	F	15,410	F	226
London Bridge Road - Shipps Corner to Crusader Circle	27,284	F	27,304	F	20
London Bridge Road - Crusader Circle to International Parkway	23,949	F	23,956	F	7
Virginia Beach Blvd. - Lynnhaven to Great Neck Road	23,560	B	23,920	B	360

Key at end of table.

Table 7.2-13

PROJECTED TRAFFIC CONDITIONS UNDER ARS 4
FOLLOWING REALIGNMENT AT NAS OCEANA
(Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Virginia Beach Blvd. - London Bridge Rd. to Chapel Lake	22,961	B	23,321	B	360
Virginia Beach Blvd. - Chapel Lake to Fountain Dr.	3,826	B	4,311	B	485
Virginia Beach Blvd. - Fountain Dr. to First Colonial	4,307	B	5,408	B	1,101
Virginia Beach Blvd. - First Colonial to Oceana	13,306	C	14,691	D	1,385
Virginia Beach Blvd. - Oceana to Shipps Ln.	3,828	B	4,901	B	1,073
Virginia Beach Blvd. - Shipps Ln. to Birdneck	22,970	B	23,483	B	513
Virginia Beach/Norfolk Expressway (SR44) - Lynnhaven to Great Neck	66,882	C	67,281	C	399
Virginia Beach/Norfolk Expressway (SR44) - Great Neck to First Colonial	40,383	B	40,782	B	399
Virginia Beach/Norfolk Expressway (SR44) - First Colonial to Birdneck	44,253	B	44,522	B	299
Laskin Road - Great Neck to Victor Cr.	45,927	F	46,000	F	73
Laskin Road - Victor Cr. to First Colonial	48,234	F	48,234	F	384
Laskin Road - First Colonial to Birdneck Rd.	22,649	B	22,867	B	218
Bells Road - Birdneck to Oceana Blvd.	7,963	C	8,346	C	383
Birdneck Road - General Booth to Bells	8,274	C	8,453	C	179
Birdneck Road - Bells to Owl's Creek	12,205	D	12,384	D	179

Key at end of table.

Table 7.2-13 (Cont.)

Note: LOS based on Generalized Annual Average Daily Volumes for Area's Transitioning into urbanized areas as established in Level of Service Standards and Guidelines Manual for Planning (Florida Department of Transportation 1992).

Key:

A = Free-flow conditions.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds, however low maneuverability.
E = Traffic at capacity of segment; unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
NASO = Naval Air Station Oceana.

Sources: HRPDC 2015 Regional Transportation Model 1995c.

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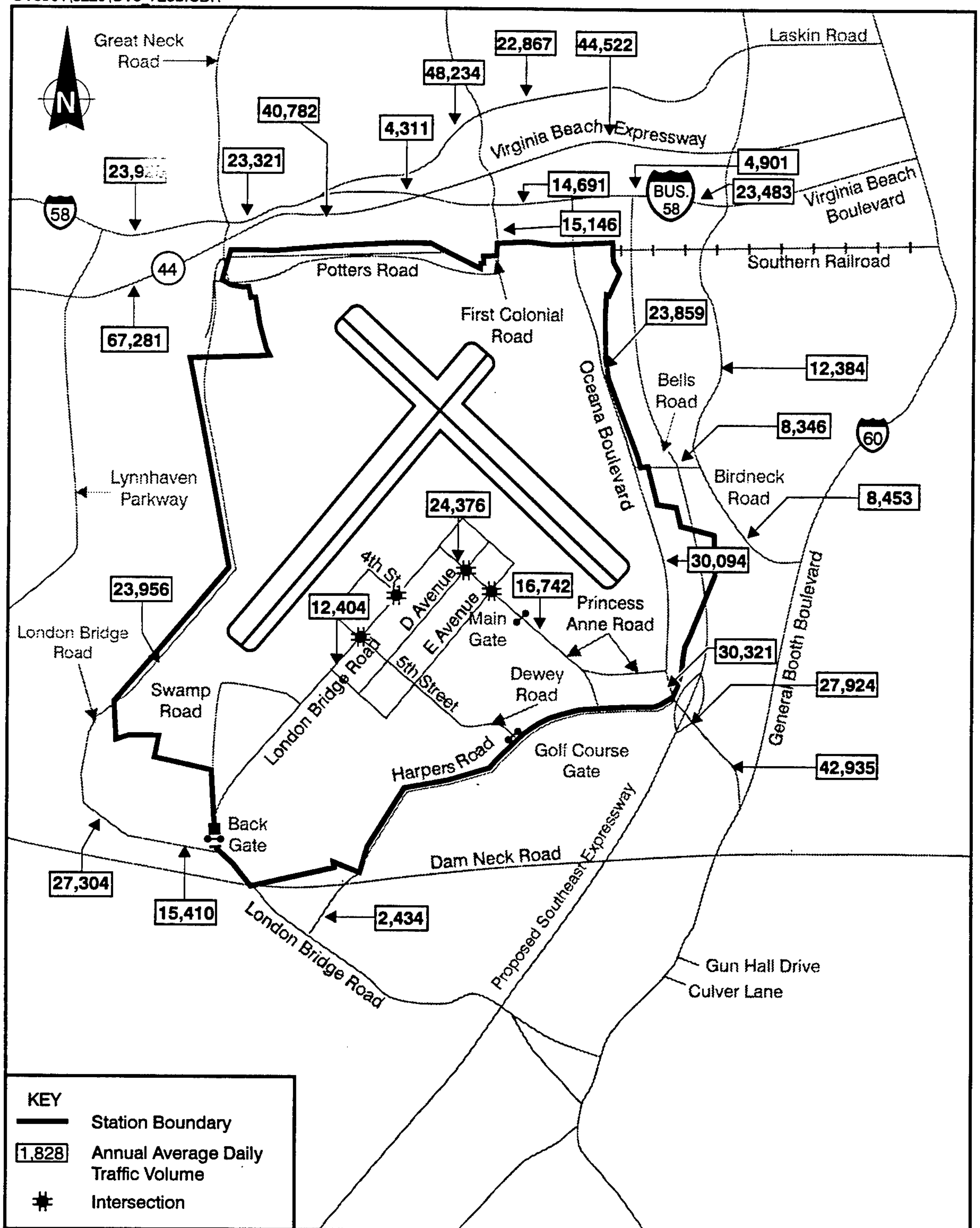


SOURCE: Hampton Roads Planning District Commission 1995c

SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 7.2-3 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING NAS OCEANA FOLLOWING REALIGNMENT UNDER ARS 4

7.2.8 Noise

Of the five ARSs, ARSs 4 and 5 would result in the lowest levels of noise impacts at and around NAS Oceana and NALF Fentress because five squadrons would be relocated to other bases. Figure 7.2-4 presents projected 1999 AAD noise contours compared to existing 1978 AICUZ noise contours. Table 7.2-14 compares the estimated area and population within the 1978 AICUZ contours to projected 1999 noise contours under ARS 4. The projected 65 to 75 dB noise contour for ARS 4 would cover an area of 30,714 acres (12,430 hectares), with an estimated population of 74,368 people. The 75 dB or greater contour would cover an area of 25,296 acres (10,237 hectares), with an estimated population of 44,508 (Wyle Labs 1997). New areas exposed to an Ldn of 65 to 75 dB would total 9,415 acres (3,810 hectares) with an estimated population of 14,800 people. New areas exposed to an Ldn of 75 dB or greater would total 6,459 acres (2,614 hectares), with an estimated population of 12,176. As in ARSs 1, 2, and 3, selected areas in the vicinity of NAS Oceana would experience a decrease in noise levels due to existing aircraft flight tracks and runway utilization (see Table 7.2-15). Approximately 16,285 people would realize reduced noise levels, including an estimated 11,226 who would experience a decrease in high noise levels (greater than 75 Ldn).

Table 7.2-16 presents the projected site-specific Ldn at schools located within the 65 dB or greater Ldn contour. The projected impacts at these locations vary, ranging from a 1 to 4 dB increase over existing conditions (Wyle Labs 1997). Schools are considered compatible with outside noise levels between 65 and 75 Ldn only if they have sufficient sound attenuation to reduce interior noise levels to approximately 45 dB. To analyze potential noise impacts to schools, the school-day (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) Leq was calculated for 1999 conditions for those schools expected to be within the 65 dB or greater Ldn (see Table 7.2-16). Use of central air conditioning systems in association with closed windows normally reduces noise levels by approximately 25 dB. Therefore, school sites with a 1999 exterior Leq of 70 dB or less would likely experience minimal interference. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at those schools of particular concern.

The maximum sound levels of typical F/A-18 sorties that would be conducted at NAS Oceana and NALF Fentress are shown in Table 7.2-17. Levels for F-14s are presented for comparative purposes. The anticipated number of average day operations by event is presented in Table 7.2-18.

Table 7.2-14

OFF-STATION AREA AND ESTIMATED POPULATION
WITHIN 1978 AICUZ, EXISTING 1997, AND PROJECTED 1999 NOISE CONTOURS
NAS OCEANA/NALF FENTRESS - ARS 4

Ldn	1978 AICUZ		1997 Noise Contours		1999 Noise Contours		New Area/Population Exposed Relative to 1978 AICUZ[a]	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	31,214 (12,632)	66,123	13,293 (5,379)	33,545	30,714 (12,430)	74,368	9,415 (3,810)	14,800
75 dB or greater	20,361 (8,240)	42,445	4,949 (2,002)	1,295	25,296 (10,237)	44,508	6,459 (2,614)	12,176
Total	51,575 (20,872)	108,568	18,242 (7,382)	34,840	56,010 (22,667)	118,876	15,874 (6,424)	26,976

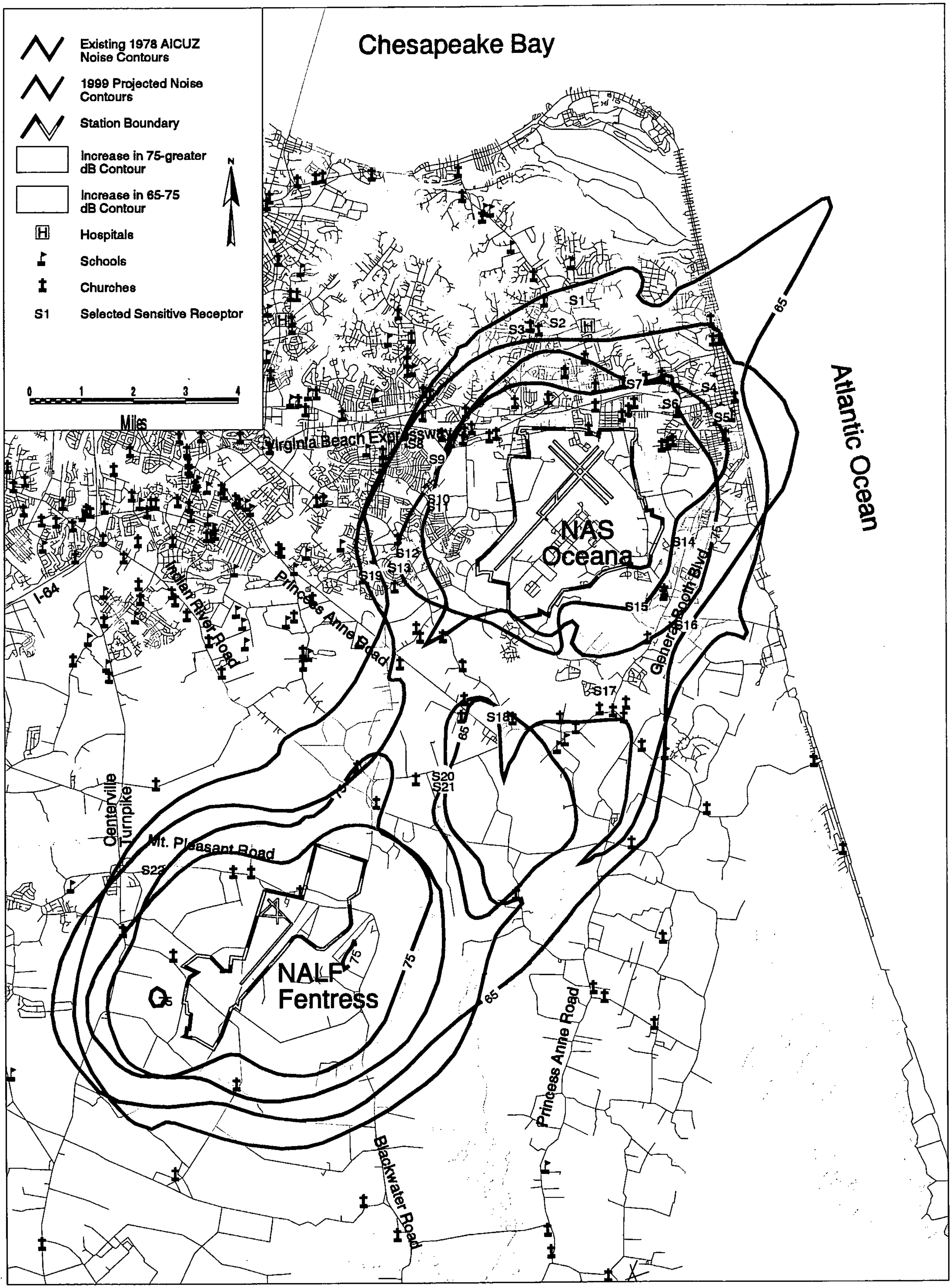
Note: Numbers exclude water areas.

[a] Represents only new area/population that previously were not exposed to listed noise levels under 1978 AICUZ. Does not equal the difference between 1978 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.



Source: U.S. Navy 1978, Wyle Labs 1997

Figure 7.2-4

ARS 4 - Comparison of 1978 and Projected 1999 Average Annual Day Noise Contours

NAS Oceana

Table 7.2-15

DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE RELATIVE TO 1978 AICUZ NAS OCEANA/NALF FENTRESS-ARS 4

Reduction in Ldn	Area in Acres (Hectares)	Estimated Population
75+ to 65-75 Ldn	-2,105 (-852)	-11,226
65-75 to <65 Ldn	-5,302 (-2,146)	-5,059
Total	-7,407 (-2,998)	-16,285

Note: Numbers exclude water areas.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.

Table 7.2-16

SCHOOLS LOCATED WITHIN 1999 PROJECTED CONTOURS GREATER THAN 65 LDN NAS OCEANA/NALF FENTRESS

Identification Number[a]/Name	1997 Ldn (dB)	1999 Ldn (dB)	1999 Leq (dB)
S1 First Colonial High	59	68	66
S2 Lynnhaven Middle	61	71	69
S3 Trantwood Elementary	56	68	66
S4 Virginia Beach Middle	57	69	68
S5 Cooke Elementary	57	69	66
S6 Seatack Elementary	63	76	74
S7 Linkhorn Elementary	62	75	73
S8 Lynnhaven Elementary	55	68	65
S9 Plaza Middle	60	73	70
S10 Brookwood Elementary	66	77	74
S11 Plaza Elementary	67	78	75
S12 Holland Elementary	66	71	69
S13 Green Run Elementary	62	68	66
S14 Birdneck Elementary	67	83	75
S15 Corporate Landing Elementary & Middle	63	78	71
S16 Ocean Lake Elementary	57	73	66
S17 Strawbridge Elementary	58	69	66
S18 Kellam High	56	65	62
S19 Rosemont Elementary	59	64	63
S20 Princess Anne Elementary	52	65	62
S21 Princess Anne Middle	52	65	62
S22 Butts Road Intermediate	52	72	63

[a] Schools are shown on Figure 7.2-4.
[b] Seatack and Linkhorn elementary schools are being relocated.

Key:

Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

Table 7.2-17 MAXIMUM SOUND LEVEL AT RECEPTOR WITH AIRCRAFT AT 1,000 FEET AGL (decibels)			
	F/A-18	F-14A	F14B/D
Departures	108	97	96
Arrivals	104	83	88
Touch-and-Go	97	87	91
FCLP			
Oceana	97	87	91
Fentress[a]	98	90	93

[a] 800 feet AGL.

Table 7.2-18 PROJECTED AVERAGE DAY OPERATIONS FOR SELECTED F/A-18 EVENTS		
	NAS Oceana	NALF Fentress
Departures	48	8
Arrivals	48	8
Touch-and-Go[a]	79	0
FCLP[a]	2	49

a Touch-and-Go and FCLP sorties equal two operations each.

The projected noise contours presented in Figure 7.2-4 are based on current operating procedures and flight patterns at NAS Oceana. The station continually evaluates noise mitigation options to reduce the noise impacts on the local community. These include an evaluation of:

- Arrival and departure procedures;
- Airfield hours of operation;
- Pattern altitudes;

- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

NAS Oceana would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation. These options are discussed in Section 4.8.

7.2.9 Air Quality

7.2.9.1 Air Quality Regulations

The air quality regulations discussion presented in 4.9.1 is also applicable to ARS 4.

7.2.9.2 General Conformity Rule

The General Conformity Rule discussion presented in Section 4.9.2 is also applicable to ARS 4.

7.2.9.3 Projected Emissions at NAS Oceana

Projected emissions for ARS 4 are presented in Table 7.2-18. The categories of sources for ARS 4 would be identical to those for ARS 1. Fewer F/A-18 aircraft and the siting of the FRS at NAS Oceana in 1999 are the only changes affecting emissions. These changes lower the total emissions projected for NAS Oceana in the categories of aircraft operations, maintenance run-ups, and stationary source engine test cell operations. Other sources listed in Table 7.2-19 would not be altered by the decrease in the number of F/A-18 aircraft in ARS 4 compared to ARS 1. For example, stationary source emissions would not be reduced by an appreciable amount because the large majority of assets would still be located at NAS Oceana. Boilers used to generate steam and hot water would still be operated but with only slightly reduced utility demand on them. None of the existing boilers are expected to be shut down.

The estimated nonattainment precursor emissions in 1999 for aircraft operations at NAS Oceana would be 310 tons per year of VOCs and 451 tons per year of NO_x. Attainment pollutant emissions would be 821 tons per year of CO, 20 tons per year of SO_2, and 242 tons per year of PM_{10}. Total nonattainment precursor emissions for other mobile sources, which include in-frame engine maintenance run-ups, would be 54 tons per year of

Table 7.2-19

EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 4

FOR 1993 AND 1996-1999

(tons per year)

	1993					1996					1997				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:															
Mobile Sources:															
Aircraft Operations	272.13	328.88	609.85	18.59	152.58	122.93	223.94	294.02	10.76	121.28	150.10	288.07	359.45	13.80	155.99
Total Aircraft	272.13	328.88	**609.85**	**18.59**	**152.58**	122.93	223.94	**294.02**	**10.76**	**121.28**	150.10	288.07	**359.45**	**13.80**	**155.99**
Other Mobile Sources:															
GSE	5.13	26.43	72.65	1.71	2.00	0.00	0.00	0.00	0.00	0.00	4.57	34.01	18.73	2.20	2.66
Maintenance Run-ups	70.29	177.95	130.69	5.82	47.42	29.40	136.41	61.78	3.90	47.42	38.29	198.30	97.19	5.86	72.28
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	75.97	211.27	**204.82**	**7.98**	**49.90**	29.96	143.30	**63.26**	**4.35**	**47.90**	43.42	239.20	**117.40**	**8.51**	**75.42**
Stationary Sources:															
Boilers:	1.13	32.32	8.31	22.09	3.84	0.78	29.13	7.52	23.76	3.63	0.78	29.13	7.52	23.76	3.63
Generators	0.71	8.67	1.87	0.57	0.61	0.71	8.67	1.87	0.57	0.61	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	6.24	37.65	49.40	1.81	4.32	3.94	28.44	39.05	1.31	3.95	5.04	37.00	50.82	1.71	4.63
JP-5 Fuel Handling	0.66	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
Service Station	19.35	0.00	0.00	0.00	0.00	4.46	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00
Painting	19.30	0.00	0.00	0.00	0.00	13.29	0.00	0.00	0.00	0.00	24.05	0.00	0.00	0.00	0.00
Construction:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary	47.39	78.64	**59.58**	**24.47**	**8.77**	23.64	66.24	**48.44**	**25.64**	**8.19**	37.19	94.00	**65.61**	**29.24**	**10.47**
Total NASO	395.49	618.78	**874.24**	**51.04**	**211.25**	176.54	433.48	**405.72**	**40.75**	**177.37**	230.71	621.26	**542.45**	**51.55**	**241.88**
NALF Fentress:															
Aircraft	13.48	146.63	37.00	6.81	30.87	7.29	154.27	18.14	6.28	42.05	9.17	187.79	22.31	7.43	55.04
Total Annual:	408.97	765.41	**911.25**	**57.85**	**242.12**	183.83	587.74	**423.86**	**47.03**	**219.42**	239.88	809.05	**564.76**	**58.98**	**296.93**

Table 7.2-19
EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 4
FOR 1993 AND 1996-1999
(tons per year)

	1998					1999				
Source Type	VOCs	NOx	CO	SO2	PM10	VOCs	NOx	CO	SO2	PM10
NAS Oceana:										
Mobile Sources:										
Aircraft Operations	244.14	383.85	631.89	17.44	206.40	310.21	450.81	820.90	20.09	242.07
Total Aircraft	**244.14**	**383.85**	**631.89**	**17.44**	**206.40**	**310.21**	**450.81**	**820.90**	**20.09**	**242.07**
Other Mobile Sources:										
GSE	0.10	1.21	0.26	0.08	0.08	0.00	0.00	0.00	0.00	0.00
Maintenance Run-ups	68.17	244.70	173.46	4.07	95.19	53.23	223.66	137.81	6.58	83.56
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	**68.83**	**252.79**	**175.20**	**4.60**	**95.75**	**53.79**	**230.55**	**139.29**	**7.03**	**84.04**
Stationary Sources:										
Boilers:	0.62	27.13	6.68	22.82	3.38	0.62	27.13	6.68	22.82	3.38
Generators	2.11	27.87	7.27	3.77	2.21	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	9.06	48.58	63.85	1.99	9.17	9.06	48.58	63.85	1.99	9.17
JP-5 Fuel Handling	0.81	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
Service Station	6.40	0.00	0.00	0.00	0.00	6.72	0.00	0.00	0.00	0.00
Painting	34.12	0.00	0.00	0.00	0.00	34.16	0.00	0.00	0.00	0.00
Construction:	1.96	19.50	6.33	1.85	3.55	0.00	0.00	0.00	0.00	0.00
Total Stationary	**55.08**	**123.07**	**84.13**	**30.43**	**18.31**	**53.57**	**103.58**	**77.80**	**28.58**	**14.76**
Total NASO	**368.05**	**759.71**	**891.22**	**52.47**	**320.46**	**417.57**	**784.93**	**1,037.99**	**55.70**	**340.87**
NALF Fentress:										
Aircraft	10.21	225.04	26.89	8.61	70.89	10.97	247.86	29.89	9.36	80.80
Total Annual:	**378.26**	**984.76**	**918.12**	**61.09**	**391.35**	**428.54**	**1,032.79**	**1,067.88**	**65.05**	**421.67**

Note: Shaded areas indicate nonattainment pollutants of concern.
1993 data and future year estimates based on data current as of June 4 1996.

Key: VOC = volatile organic compounds. SO2 = sulfur dioxide.
NOx = oxides of nitrogen. PM10 = particulate matter. JP-5 = jet fuel.
CO = carbon monoxide. GSE = Ground Support Equipment

VOCs and 231 tons per year of NO_x. Attainment pollutant emissions would be 139 tons per year of CO, 7 tons per year of SO_2, and 84 tons per year of PM_{10}.

The estimated nonattainment ozone precursor emissions in 1999 for stationary sources, which include engine test cell operations, would be 54 tons per year of VOCs and 104 tons per year of NO_x. Attainment pollutant emissions would be 78 tons per year of CO, 29 tons per year of SO_2, and 15 tons per year of PM_{10}.

7.2.9.4 Projected Emissions at NALF Fentress

This facility is used in the same manner under ARS 4 as in ARS 1, although fewer F/A-18 operations occur under ARS 4. The projected emissions for aircraft operations are summarized by year in Table 7.2-19. In 1999, nonattainment precursor emissions (VOCs and NO_x) from these operations would be 11 and 248 tons per year, respectively. Attainment pollutant emissions would total 30 tons per year of CO, 9 tons per year of SO_2, and 81 tons per year of PM_{10}.

7.2.9.5 Total Net Projected Emissions

Table 7.2-20 presents the summary of net projected emissions from NAS Oceana and NALF Fentress for 1993 and 1996 through 1999 for ARS 4. The net change in emissions for ARS 4 would be 20 tons per year of VOCs and 267 tons per year of NO_x. ARS 4 reduces net air emissions by 86 tons per year of VOCs and 129 tons per year of NO_x compared to ARS 1. The net changes for attainment pollutants would be 157 tons per year of CO, 7 tons per year of SO_2, and 180 tons per year of PM_{10}.

7.2.10 Topography, Geology, and Soils

The impacts of ARS 4 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.10).

7.2.11 Water Resources

The impacts of ARS 4 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.11), with the exception of potential wetland impacts. Projects needed under ARS 4 would not affect any wetland areas on station.

Table 7.2-20
NET EMISSIONS CHANGE - NAS OCEANA AND NALF FENTRESS - ARS 4
(tons per year)

Year	VOCs	NOx	CO	SO2	PM10
NAS Oceana:					
1993	395.49	618.78	874.24	51.04	211.25
1996	176.54	433.48	405.72	40.75	177.37
1997	230.71	621.26	542.45	51.55	241.88
1998	368.05	759.71	891.22	52.47	320.46
1999	417.57	784.93	1037.99	55.70	340.87
Net Change:					
1993 to 1999	**22.07**	**166.15**	**163.75**	**4.66**	**129.62**
NALF Fentress:					
1993	13.48	146.63	37.00	6.81	30.87
1996	7.29	154.27	18.14	6.28	42.05
1997	9.17	187.79	22.31	7.43	55.04
1998	10.21	225.04	26.89	8.61	70.89
1999	10.97	247.86	29.89	9.36	80.80
Net Change:					
1993 to 1999	**-2.51**	**101.23**	**-7.11**	**2.55**	**49.94**
Net Change NAS Oceana and NALF Fentress:					
1993 to 1999	**19.57**	**267.38**	**156.64**	**7.21**	**179.55**

Note: Shaded areas indicate nonattainment pollutants of concern.

7.2.12 Terrestrial Environment

The impacts of ARS 4 at NAS Oceana would be less than those discussed for ARS 1 (see Section 4.12), given that neither a new stand-alone aircraft hangar nor a relatively large parking apron expansion would not be required under this alternative.

7.2.13 Cultural Resources

The impacts of ARS 4 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.13).

7.2.14 Environmental Contamination

The impacts of ARS 4 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.14) except that hazardous waste would increase by 38,000 lbs. This represents a 27% increase over 1995 levels. This increase can be accommodated within existing hazardous waste management systems.

8 Environmental Consequences and Mitigation Measures: Alternative Realignment Scenario 5

ARS 5 would involve realigning five F/A-18 fleet squadrons to MCAS Cherry Point, with the remaining six F/A-18 fleet squadrons and the F/A-18 FRS being realigned to NAS Oceana. Therefore, this section discusses potential impacts at MCAS Cherry Point and NAS Oceana. Where appropriate, mitigation measures to avoid or lessen the severity of projected impacts are discussed.

8.1 Environmental Consequences and Mitigation Measures: ARS 5 at MCAS Cherry Point

8.1.1 Airfield Operations

The projected operations under ARS 5 would not significantly affect airfield operations at MCAS Cherry Point. Projected airfield operations were calculated as part of the NASMOD analysis conducted at the station (ATAC 1997). A discussion of the components of NASMOD is presented in Section 4.1.

Table 8.1-1 presents projected basic aircraft operations at MCAS Cherry Point under ARS 5. Total operations at MCAS Cherry Point would increase from 1997 levels, growing from 116,000 to approximately 147,000 operations. This would represent a 26% increase over 1997 levels (ATAC 1997). Total operations at MCALF Bogue would remain relatively constant because it would not be used for Navy F/A-18 operations associated with ARS 5. Further, F/A-18 operations associated with ARS 5 would not significantly displace operations by other MCAS Cherry Point aircraft to MCALF Bogue.

Because ARS 5 includes the construction of a new parallel runway at MCAS Cherry Point, F/A-18 aircraft that would be realigned under ARS 5 could complete their required number of operations without significantly affecting overall airfield operations at the station. Unusually long taxi times, fuel pit delays, or denials to access certain patterns would not occur at the station as result of ARS 5 (ATAC 1997).

8.1.2 Military Training Areas

ARS 5 would result in F/A-18 aircraft based at MCAS Cherry Point and NAS Oceana using the same military training areas in eastern North Carolina. An overall discussion of projected operations is presented in Section 8.2.2.

8.1.3 Target Ranges

Under ARS 5, F/A-18 aircraft based at MCAS Cherry Point and NAS Oceana would use the same target ranges (BT-9, BT-11, and the Dare County Range) in eastern North Carolina. An overall discussion of projected operations is provided in Section 8.2.3.

8.1.4 MCAS Cherry Point Land Use

8.1.4.1 Projected Land Use

To support the realignment of five F/A-18 aircraft squadrons to MCAS Cherry Point under ARS 5, Hangars 1700, 130, 131, and 1665W would be renovated, and an addition to

Table 8.1-1

1997 and Proposed 1999 Basic Operations at MCAS Cherry Point for ARS 5

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations Day 0700-2200	Projected 1999 Airfield Operations Night 2200-0700	Projected 1999 Airfield Operations Total	% Change
AV-8 Fleet	Departure	10,123	9,882	162	10,044	
	Full Stop Visual Landing	8,369	7,991	326	8,317	
	Full Stop Instrument Landing	558	526	42	568	
	Pad Landing	1,209	1,096	74	1,170	
	Visual Touch-and-Go/Low Approach	4,612	3,986	328	4,314	
	Instrument Touch-and-Go/Low Approach	2,370	2,328	18	2,346	
	Press-Up	6,686	6,604	10	6,614	
	Pad Vertical Take-off to Pad Landing Circuit	2,986	2,708	204	2,912	
	TOTAL	36,913	35,121	1,164	36,285	
AV-8 FRS	Departure	11,570	11,207	155	11,362	
	Full Stop Visual Landing	8,365	8,038	157	8,195	
	Full Stop Instrument Landing	491	518	8	526	
	Pad Landing	2,714	2,596	45	2,641	
	Visual Touch-and-Go/Low Approach	778	732	12	744	
	Instrument Touch-and-Go/Low Approach	4,128	3,924	52	3,976	
	Press-Up	6,546	6,396	58	6,454	
	Pad Vertical Take-off to Pad Landing Circuit	2,640	2,438	96	2,534	
	TOTAL	37,232	35,849	583	36,432	
EA-6B	Departure	2,126	2,115	14	2,129	
	Full Stop Visual Landing	1,889	1,729	151	1,880	
	Full Stop Instrument Landing	238	224	24	248	
	Visual Touch-and-Go/Low Approach	5,502	5,110	348	5,458	
	Instrument Touch-and-Go/Low Approach	1,970	1,682	258	1,940	
	TOTAL	11,275	10,860	795	11,655	
F/A-18 Fleet	Departure	0	5,602	378	5,980	
	Full Stop Visual Landing	0	4,660	549	5,209	
	Full Stop Instrument Landing	0	546	225	771	
	Visual Touch-and-Go/Low Approach	0	7,148	468	7,616	
	Instrument Touch-and-Go/Low Approach	0	712	160	872	
	Field Carrier Landing Practice	0	9,686	2,554	12,240	
	TOTAL	0	28,354	4,334	32,688	
KC-130 Fleet	Departure	632	632	0	632	
	Full Stop Visual Landing	282	254	29	283	
	Full Stop Instrument Landing	350	329	20	349	
	Visual Touch-and-Go/Low Approach	1,484	1,362	104	1,466	
	Instrument Touch-and-Go/Low Approach	1,606	1,556	34	1,590	
	TOTAL	4,354	4,133	187	4,320	

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Table 8.1-1

1997 and Proposed 1999 Basic Operations at MCAS Cherry Point for ARS 5

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations Day 0700-2200	Night 2200-0700	Total	% Change
KC-130 FRS	Departure	803	805	0	805	
	Full Stop Visual Landing	284	283	6	289	
	Full Stop Instrument Landing	519	474	42	516	
	Visual Touch-and-Go/Low Approach	3,942	3,842	128	3,970	
	Instrument Touch-and-Go/Low Approach	3,356	3,282	44	3,326	
	TOTAL	8,904	8,686	220	8,906	
Transient Jet	Departure	1,798	1,658	35	1,693	
	Full Stop Visual Landing	1,328	1,221	0	1,221	
	Full Stop Instrument Landing	470	472	0	472	
	Visual Touch-and-Go/Low Approach	1,336	1,184	0	1,184	
	Instrument Touch-and-Go/Low Approach	1,052	1,054	2	1,056	
	TOTAL	5,984	5,589	37	5,626	
Transient Prop	Departure	658	661	0	661	
	Full Stop Visual Landing	219	219	0	219	
	Full Stop Instrument Landing	439	442	0	442	
	Visual Touch-and-Go/Low Approach	2,628	2,570	0	2,570	
	Instrument Touch-and-Go/Low Approach	362	346	2	348	
	TOTAL	4,306	4,238	2	4,240	
Transient Heavy	Departure	183	118	65	183	
	Full Stop Instrument Landing	183	181	2	183	
	Instrument Touch-and-Go/Low Approach	340	324	0	324	
	TOTAL	706	623	67	690	
Transient Large	Departure	694	530	164	694	
	Full Stop Visual Landing	146	146	0	146	
	Full Stop Instrument Landing	548	540	8	548	
	Instrument Touch-and-Go/Low Approach	944	910	6	916	
	TOTAL	2,332	2,126	178	2,304	
Transient Helicopter	Departure	1,765	1,367	398	1,765	
	Full Stop Visual Landing	1,765	1,732	33	1,765	
	Instrument Touch-and-Go/Low Approach	268	268	0	268	
	TOTAL	3,798	3,367	431	3,798	
	AIRFIELD TOTAL	**116,254**	**138,946**	**7,998**	**146,944**	**26%**

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Hangar 1700 would be constructed. Several other facilities would be required under ARS 5. An AIMD and a flight simulator facility are proposed within the core area of MCAS Cherry Point. A child development center is proposed along Roosevelt Road, north of the core area. The flight line medical clinic has not yet been sited.

Overall, these proposed projects are designed to take advantage of existing facilities and a formerly disturbed site, thereby minimizing potential land disturbance. The operating characteristics of these projects are consistent with adjoining land uses and would not result in any significant conflicts. However, the proposed construction of a new parallel runway required under ARS 5 would result in conflicts with existing land uses. In order to implement this project, several buildings and structures (engine test cell, a Harrier landing pad, TACAN, and air search radar) that would be located in the primary surface and clear zones for the runway would need to be demolished and/or relocated/replaced. The engine test cell is proposed for relocation at the end of Runway 28, but other relocation sites have not been identified.

The projects under ARS 5 are removed from surrounding lands off station. These projects would not result in conflicts with surrounding land uses.

8.1.4.2 Land Use Plans and Policies

The majority of proposed land use changes at MCAS Cherry Point resulting from construction under ARS 5 would be consistent with existing and proposed land use classifications outlined in the station's Master Plan. Proposed projects that would be inconsistent with the Master Plan include parallel runway, child development center, and AIMD. Project descriptions, locations and proposed land use classifications are discussed below.

- The hangar renovations and the addition to Hangar 1700 would be located at the eastern edge of the core area and to the west of the flight line. These projects would be consistent with the Master Plan proposed use of this area as "maintenance/production." The addition to Hangar 1700 would impact 0.5 acre (0.2 hectare).

- The flight simulator facility would be located at the east end of the core area and would be consistent with the Master Plan proposed use of this area as "training." This facility would impact 2.6 acres (1.1 hectares).

- The AIMD facility would be located at the east end of the core area on a cleared piece of land and would not be consistent with the Master Plan designation of this area as "administration." However, the 1988 Master Plan did not foresee the eventual removal of all BEQ facilities in this area. Because much of the former troop

housing in the vicinity of the site has been removed and compatible land use activities occur adjacent to the site along the flight line, the proposed AIMD facility would not significantly affect surrounding land uses.

- The child development center would be located at the northern end of the base, along Roosevelt Road, and would not be consistent with the Master Plan proposed use of this area as "open/conservation." However, the proposed use of this site under ARS 5,"community facility," would not significantly impair the intent of the plan for this area of the station. Family housing is proposed in the Master Plan and would be located across Roosevelt Road from this site. The child development center would impact 0.2 acre (0.08 hectare).

- The relocation site for the engine test cell is at the end of Runway 28 and is consistent with the Master Plan proposed use of this area for "operations." This relocation would impact 1.6 acres (0.65 hectare).

- The proposed runway would parallel Runway 23 to the northeast. The Master Plan designates land use within the runway corridor for "conservation/open" with some area of "operations." The runway pavement would impact 44.3 acres (17.9 hectares), with airfield safety clearances impacting an additional 540 acres (219 hectares).

With the exception of the proposed runway, these actions would not result in any significant long-term land use disturbances or changes at the station. Minor land use inconsistences between the Master Plan and the child development center and the AIMD facility are not significant.

The proposed runway and the child development center are proposed for construction in designated "open space/conservation" areas, and therefore, the projects would not be consistent with the station's Integrated Natural Resource Management Plan.

Construction and operation of new facilities under ARS 5 are not expected to affect the coastal zone. Potential impacts to the resources at the coastal zone will be minimized to the maximum extent practicable through agency reviews (NCDEHNR, Division of Coastal Management), permitting requirements, and implementation of best management practices.

A coastal zone consistency determination will be prepared by the Navy and included as part of the FEIS. Concurrence will be sought from the NCDEHNR on the consistency determination.

With regard to the AICUZ program at MCAS Cherry Point, noise impacts from the implementation of ARS 5 would result in the expansion of associated noise zones (see Section 8.1.8). Part of the increase is attributable to changes in runway utilization between the 1988 AICUZ and the projected contours. The 65 to 75 dB Ldn contour (i.e., Noise Zone 2) would

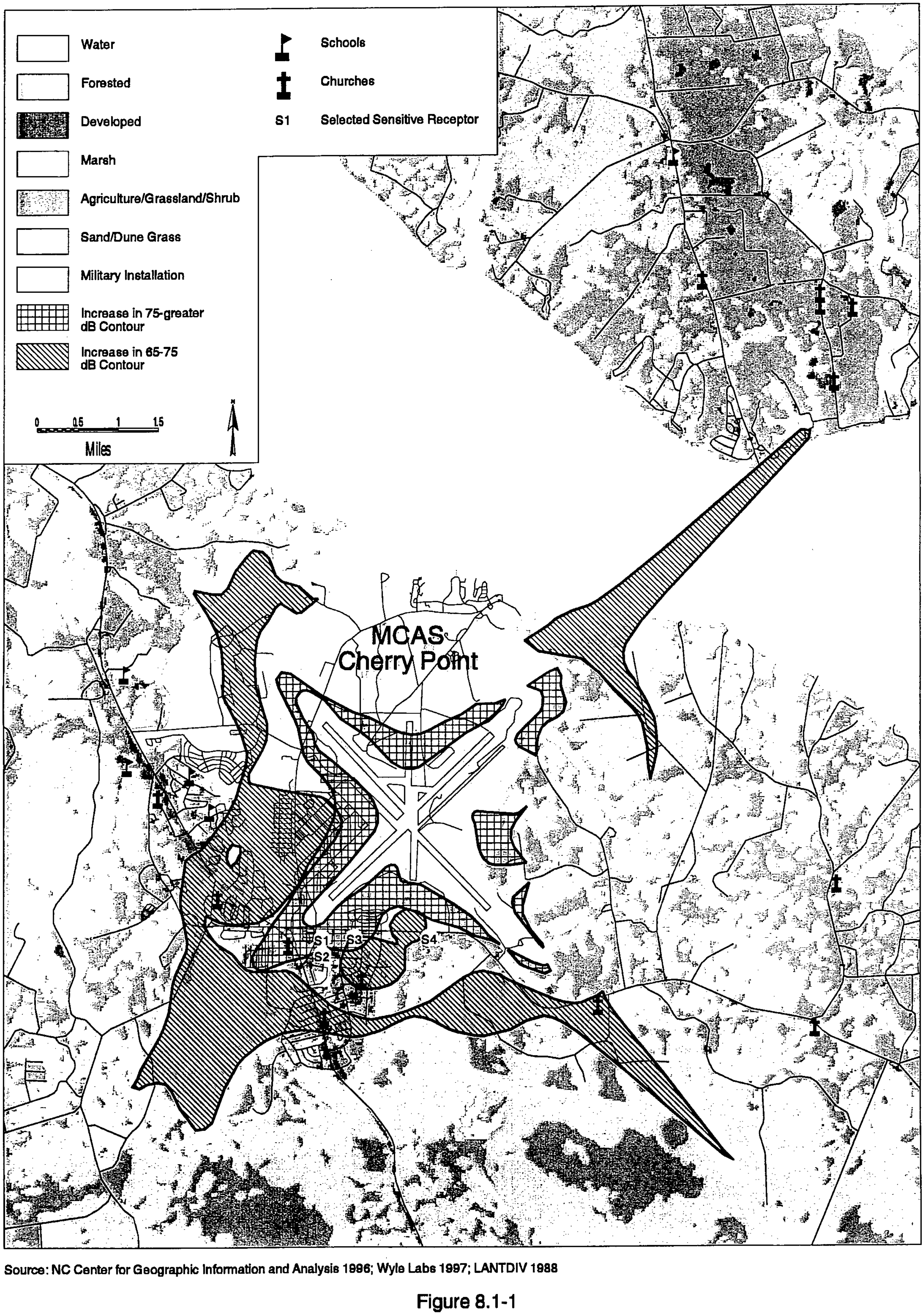
grow by approximately 4,449 acres (1,801 hectares) from the corresponding area in the current AICUZ program. The 75 dB or greater Ldn contour (i.e., Noise Zone 3) would grow by approximately 420 acres (170 hectares) from the corresponding area in the current AICUZ program. Figure 8.1-1 presents the increase in land use coverage between existing AICUZ and projected 1999 noise contours at MCAS Cherry Point under ARS 5.

Under the MCAS Cherry Point AICUZ Program, the reconfiguration of APZs would result in fewer impacts to land use activities off station. In ARS 5, operations would be shifted to Runway 23 to take advantage of the parallel runway configuration and increased runway capacity. However, Runway 32 would remain the primary instrument approach runway. As a result, implementation of ARS 5 would result in a total increase in APZ coverage of 311 acres (125 hectares) (see Table 8.1-2). APZs under ARS 5 are less than under ARS 3 because of the construction of a parallel runway and redistribution of operations to the new alignment.

Figure 8.1-2 presents 1999 projected APZs, which include APZs under the existing AICUZ program as well as the APZs associated with operations of two additional F/A-18 squadrons. Figure 8.1-3 shows the increases between 1988 and 1999 APZs and land use. As discussed in Section 3.1.4, the APZs do not indicate the probability of an accident but rather the probable accident location should an accident occur. Appendix G provides more information on the development of APZs. The Navy's recent update of aircraft accident data for the period from 1982 to 1997 indicates that the F/A-18 experiences fewer accidents than other fighter aircraft in the inventory. In fact, during this period only three F/A-18 Class "A" accidents (i.e., aircraft suffered more than $1 million in damage or a fatality occurred) were reported within a 5-mile radius of Navy and Marine Corps airfields in the U.S. and Japan.

Implementation of ARS 5 would result in increases in noise levels and APZs. This may affect availability of federally guaranteed mortgage loans. HUD, FHA, and VA mortgage policies generally prohibit guaranteeing mortgage loans for new homes located within noise contours of 75 dB Ldn or greater or within clear zones. These same mortgage policies make availability of federally guaranteed mortgage loans discretionary for new homes located within noise contours of 65 to 75 dB Ldn.

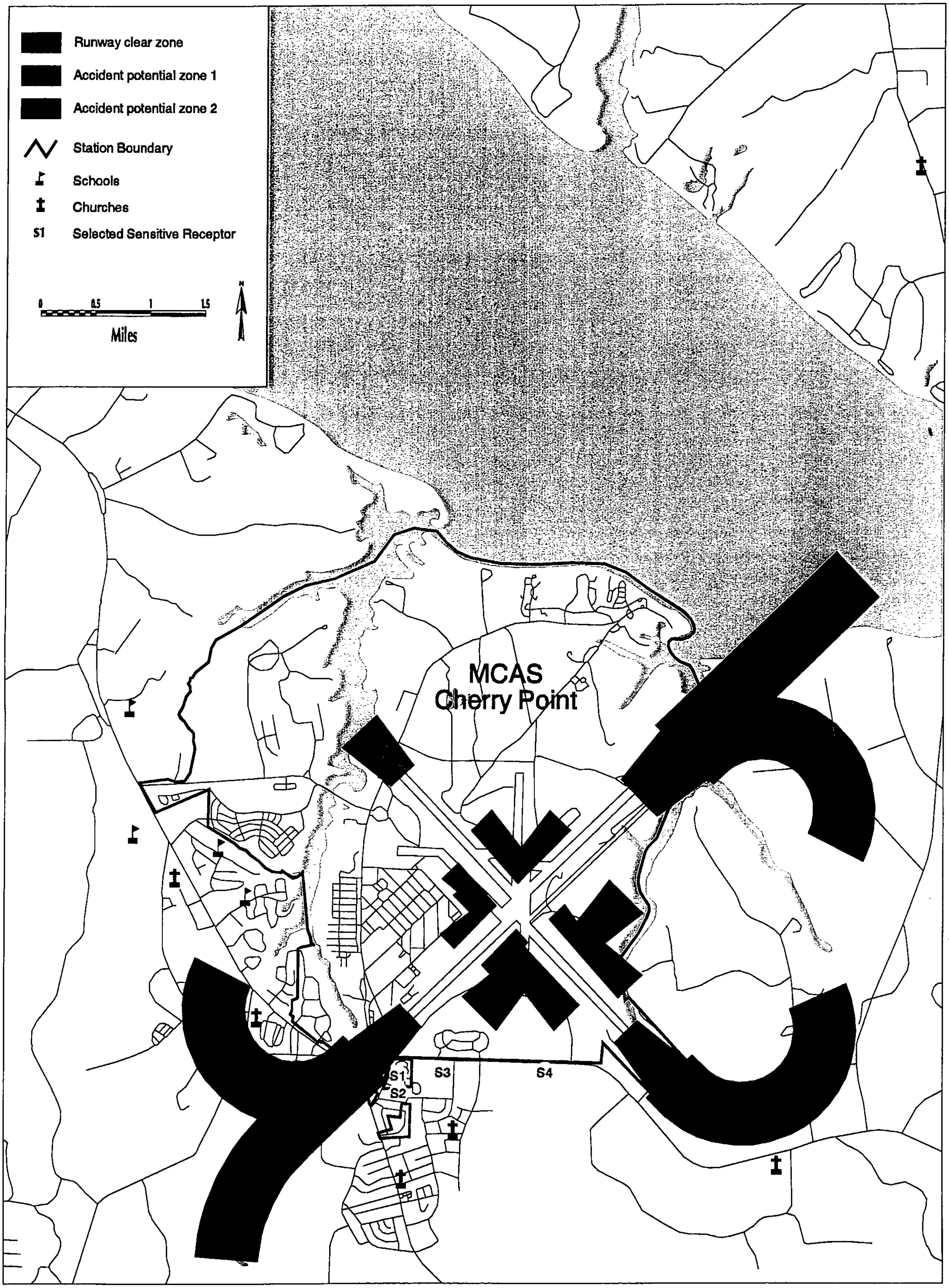
The term "new home" includes new construction, existing homes that are less than one year old, and existing homes that have been substantially remodeled. HUD, FHA, or VA mortgage policies may also impose conditions on mortgage loan guarantees (such as written acknowledgment of noise conditions) for existing homes located in 75 dB Ldn or greater contours or within clear zones.



Source: NC Center for Geographic Information and Analysis 1996; Wyle Labs 1997; LANTDIV 1988

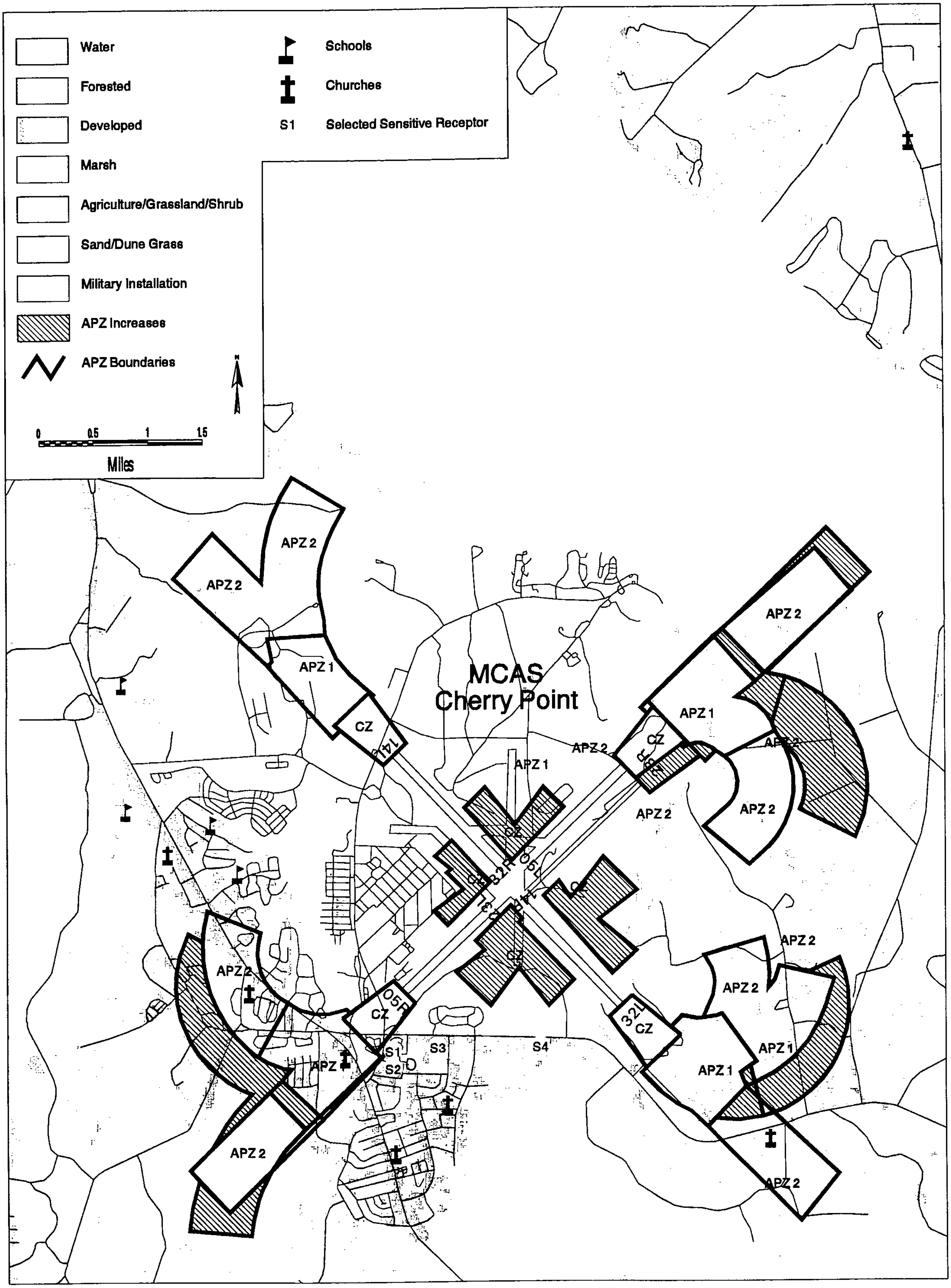
Figure 8.1-1

ARS 5 - Increase Between Existing AICUZ Boundaries and Projected 1999 Noise Contours and Land Use MCAS Cherry Point



Source: Wyle Labs 1997

Figure 8.1-2
ARS 5 - Projected 1999 APZs
MCAS Cherry Point



Source: NC Center for Geographic Information and Analysis 1996; Wyle Labs 1997

Figure 8.1-3
ARS 5 - Increase Between Existing AICUZ and Projected 1999 APZs and Land Use MCAS Cherry Point

Table 8.1-2

LAND USE WITHIN EXISTING (1988) AND PROJECTED (1999) APZs AT MCAS CHERRY POINT - ARS 5

Land Use	1988 Acres Impacted	1988 Hectares Impacted	Projected Acres Impacted[a]	Projected Hectares Impacted	Change in Acres/ Hectares
Clear Zone					
Military Installation[b]	515	208	1,343	544	828/336
Agriculture/Grassland/Shrub	3	1	10	4	7/3
Developed	1	<1	1	<1	0/0
Marsh	1	<1	11	4	10/3
Forested	0	0	1	<1	1/0
Water	0	0	7	3	7/3
APZ 1					
Military Installation	537	217	220	89	-317/-128
Agriculture/Grassland/Shrub	273	110	190	77	-83/-33
Developed	54	22	42	17	-12/-5
Marsh	205	83	350	142	145/59
Forested	377	153	363	147	-14/-6
Water	80	32	93	38	13/6
APZ 2					
Military Installation	334	135	0	0	-334/-135
Agriculture/Grassland/Shrub	598	242	187	76	-411/-166
Developed	66	27	28	11	-38/-16
Marsh	364	147	445	180	81/33
Forested	1,552	628	1,357	549	-195/-79
Water	371	150	372	151	1/1
TOTAL	5,331	2,157	5,020	2,032	-311/-125

[a]Includes existing APZs, plus APZ increases under this ARS.
[b]Military installation defines all land use within the station.

Implementation of the proposed projects would require permits/reviews from NCDEHNR for wetland impacts/mitigation, stormwater management, and water quality. However, the Navy has determined that the proposed action would be consistent to the maximum extent practicable with the North Carolina Coastal Zone Management Program.

8.1.5 Socioeconomics and Community Services

8.1.5.1 Population, Employment, Housing, and Taxes/Revenues

Population

The proposed realignment of five F/A-18 aircraft squadrons to MCAS Cherry Point under ARS 5 would have only a minor impact on the total personnel loading at the station and in the four-county area surrounding the station. The realignment of these five squadrons would result in the relocation of approximately 1,300 personnel (140 officers, 1,150 enlisted personnel, and 10 civilians) to MCAS Cherry Point.

Communities in the four-county area would be impacted in a similar fashion. A total of 2,870 new residents would move into the region as a result of the proposed relocation under ARS 5. Assuming that the relocating personnel and their families would have a similar geographical distribution as the existing personnel assigned to the station, the majority of these residents would live in Craven County, with a portion of the Craven County residents living in the City of Havelock. Table 8.1-3 shows the projected population change for each of the four counties surrounding the station and the City of Havelock.

Because the majority of the personnel are expected to relocate to Craven and Carteret counties, the most populous counties in the region, the proposed realignment would not have significant impact on the demographic characteristics of these communities. The population would increase by 2,120 in Craven County and by 530 in Carteret County (see Table 8.1-3).

Economy, Employment, and Income

ARS 5 would have a long-term, positive economic impact on the four-county area surrounding the station. Direct military employment would increase by approximately 1,300 military personnel over current levels. As a result, MCAS Cherry Point would inject approximately $50 million into the regional economy each year through military payroll expenditures. Additionally, to accommodate the relocating aircraft and personnel, approximately $67.4 million in construction and renovation expenditures would be made at MCAS Cherry Point (see Table 8.1-4).

Table 8.1-3

SOCIOECONOMIC IMPACTS OF THE PROPOSED REALIGNMENT OF FIVE F/A-18 AIRCRAFT SQUADRONS TO MCAS CHERRY POINT UNDER ARS 5[a]

	Havelock[b]	Craven	Carteret	Jones	Pamlico	Other	Total Effects[d]
Population Impacts							
Total military personnel relocating	230	960	240	10	10	80	1,300
Number of military dependents	290	1,160	290	10	10	100	1,570
Total Population Change	**520**	**2,120**	**530**	**20**	**20**	**180**	**2,870**
Personnel and Regional Housing Impacts							
Total officers relocating	20	110	30	0	0	10	150
Total enlisted personnel relocating	210	850	210	10	10	70	1,150
Total Military Households Relocating	**230**	**960**	**240**	**10**	**10**	**80**	**1,300**
Fiscal Impacts							
Total population change	520	2,120	530	20	20	180	2,870
Local per capita tax contribution	$87	$414	$562	NA	NA	NA	NA
Estimated Change in Local Tax Contributions	**$45,240**	**$877,680**	**$297,860**	**$0**	**$0**	**$0**	**$1,220,780**
Education Impacts[c]							
Total elementary school-age children	NA	300	70	0	0	30	400
Total middle school-age children	NA	90	20	0	0	10	120
Total high school-age children	NA	60	10	0	0	10	80
Total Number of School-age Children	**NA**	**450**	**100**	**0**	**0**	**50**	**600**

a All figures have been rounded to the near ten. Totals may not add due to rounding errors.
b City of Havelock figures are included in Craven County statistics and, therefore, should not be double counted in the totals.
c School-aged children residing in the City of Havelock attend Craven County Public Schools.
d Total effects summation includes statistics from the four-county and other columns. Also see Note b.

Table 8.1-4 **DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF 5 F/A-18 SQUADRONS TO MCAS CHERRY POINT UNDER ARS 5**	
Direct Economic Impacts	
Increase in Military and Civilian Payroll	$50,398,000
Construction Expenditures	$67,459,000
Total	$117,857,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$8,823,000
Employment Opportunities (jobs)	430

[a] Indirect economic impacts have only been calculated for construction expenditures.

As described for other ARSs, this injection of funds would stimulate the regional economy and the positive economic impacts would be "multiplied" as they are cycled through the economy. The RIMS II model was used to quantify the total impacts associated with this additional economic activity. As shown on Table 8.1-4, the $67.4 million construction program that would be completed at MCAS Cherry Point would generate approximately $8.8 million in additional employee earnings and create approximately 430 additional new jobs in the region. When the impacts associated with the increase in military payroll are included, the positive economic effects would become greater.

Housing

The proposed relocation of 1,300 additional military personnel to MCAS Cherry Point under ARS 5 would have a moderate impact on military and off-station housing. Demand for all forms of military-controlled housing would increase, including the demand for bachelor enlisted and bachelor officer housing.

However, MCAS Cherry Point's BEQs and BOQs would have sufficient capacity to handle the increase in personnel. Currently, there are approximately 200 spaces available in the BEQs at MCAS Cherry Point and there are another 260 BEQ spaces filled by geographical bachelors. Because geographical bachelors are only allowed to live in bachelor housing on a space-available basis, the existing facilities at MCAS Cherry Point could house nearly 40% of the total enlisted personnel relocating. Because most of the senior enlisted personnel prefer to reside off-station and a large number of the relocating enlisted personnel are married, and

therefore not eligible for bachelor accommodations, existing BEQ facilities should be more than adequate to handle any increase in demand for these units. If it is assumed that 20% of all enlisted personnel relocating to MCAS Cherry Point would choose to live in the BEQs, then approximately 230 personnel would live on-station. The remaining bachelor enlisted personnel would live in the local community.

Likewise, BOQ facilities would be more than adequate to handle the additional officers who would be relocating to MCAS Cherry Point. If the spaces currently occupied by geographical bachelors were utilized, in addition to the vacant units, more than 20 officer billets could be made available for the relocating personnel. Because the majority of officers prefer to reside off-station and a large proportion of all officers are married, the 20 spaces should be more than adequate to handle any additional demand for bachelor officer housing.

The relocation of 1,300 military personnel would lead to an increase of approximately 670 military households requiring family housing. These additional 670 families would increase the demand for military-controlled family housing. The primary impact to the military-controlled housing would be the increase in the demand for the units and a corresponding increase in the length of time an individual would have to wait for a unit. Although the additional 670 families moving into the region would increase the demand for military family housing, the supply of these units is not expected to increase. Currently, all adequate military family housing at MCAS Cherry Point is being utilized to the maximum extent practicable. Therefore, it is assumed that all of the relocating families would reside in the local community.

Similarly, the proposed relocation of approximately 660 households (bachelors not living on-station and family) to the four-county area around the station would have only a minor impact on the regional housing market. The additional personnel would increase the demand for housing units, especially rental units. However, given the relatively small number of households relocating compared to the total number of housing units available in the region, the proposed relocation would not have a significant effect on the supply or price of houses in the area.

Taxes and Revenues

The proposed realignment of five F/A-18 aircraft squadrons to MCAS Cherry Point under ARS 5 would have a positive impact on the generation of tax revenues in the region and in North Carolina as a whole. Because most of the relocating personnel currently reside outside of North Carolina, any state or local taxes these individuals pay would represent an

increase in tax revenues for the state. In addition, sales tax and corporate income tax would increase as a direct result of the positive economic impacts of the realignment.

The proposed relocation would result in an increase of 2,870 new residents in the four-county area. Local government revenue generated annually by these new residents would be approximately $1,220,780 (see Table 8.1-3).

The increase in the total population of the region would result in an increase in the demand for communities services and facilities. In particular, the increase in school-age military dependents would lead to an increase in total school expenditures. Districts that would be significantly impacted by the increase in federally-connected students may receive additional impact aid from the U.S. Department of Education. This would cover a portion of the average costs per student.

Because there would be no additional military family housing constructed to house these relocating personnel and the existing military family housing units are filled to capacity, the additional families would be living on private property in the surrounding communities. Property taxes levied on these residences would help offset the increase in costs.

Because the Navy would spend additional funds via construction activities and procurement expenditures, the total amount of economic activity in the region would increase. As a result, additional employment, employee earnings, sales receipts, and economic output would expand, leading to an increase in tax revenues.

As a result of all of these factors, communities in the region would not experience any significant adverse impacts from the implementation of ARS 5.

8.1.5.2 Community Services

The proposed realignment of the five F/A-18 squadrons to MCAS Cherry Point under ARS 5 would not significantly affect the on-station or off-station provision of community services. The existing staff, equipment, and facilities at MCAS Cherry Point and within the communities should be sufficient to handle any increased demand for services on-station.

For example, Craven County currently has approximately 5.7 fire fighters and 2.7 emergency personnel per 1,000 residents. Following the proposed realignment these ratios are not expected to change, indicating no significant change in the level of service provided to county residents. This is also true for Carteret County. Carteret County currently maintains a ratio of 1.1 police officers per 1,000 residents; Craven County has a ratio of 0.6 police officer per 1,000 residents. These ratios would not change as a result of the relocation of the military families to the area, thereby indicating that no change in the level of service would occur.

To ensure adequate provision of medical services to the pilots, a 5,591-square-foot (520-square-meter) flight line medical clinic is proposed under ARS 5.

The proposed realignment would impact the Craven County Public Schools and the Carteret County Public Schools, but impacts would not be significant. Using the current demographic characteristics of the relocating squadrons and the existing geographical distribution of base personnel, approximately 450 additional children would attend the Craven County Public Schools and 100 additional students would attend the Carteret County Public Schools. The majority of these additional students would attend elementary school, with only a small number of these students attending middle school or high school. In Craven County, approximately 300 additional elementary students, 90 middle school students, and 60 high school students would relocate to the area as a result of the proposed realignment (see Table 8.1-3).

The impact of these additional students would be somewhat tempered by the relative size of the school districts and by the fact that the districts have sufficient excess physical capacity to handle the increase in students.

Current enrollment and capacity statistics of the two districts show that Craven County Public Schools could accommodate approximately 1,030 additional students and Carteret County Public Schools could accommodate approximately 290 additional students. Once the current school construction programs are completed, the total excess capacity of these districts would increase.

8.1.6 Infrastructure

8.1.6.1 Water Supply

The implementation of ARS 5 would result in the transfer of approximately 1,300 military persons to MCAS Cherry Point. It is estimated that approximately 20% of enlisted personnel being transferred under ARS 5 (230 personnel), would reside at the station. Because there is currently a waiting list for family housing, no net increase in on-station family housing population, and thus water consumption, is projected under ARS 5.

According to personnel at MCAS Cherry Point, daily water usage is approximately 3.4 MGD at the station. The station's water distribution and treatment system has the capacity to provide 6 MGD. Therefore, excess water capacity is 2.6 MGD. If 230 additional military personnel live on-station, and a daily water usage of 80 gallons per person is assumed, the station's water demand would increase by approximately 0.02 MGD. Additionally, if it is assumed that during an average work day, personnel working at MCAS Cherry Point use approximately 30 gallons of water per person, then the increase in daily water

consumption by an additional 1,300 personnel is expected to be 0.04 MGD. Therefore, the net increase in water usage at MCAS Cherry Point under ARS 5 would be 0.06 MGD. The station's water distribution and treatment system has sufficient capacity to support this increase.

With dependents, the net increase of 1,300 personnel transferred to MCAS Cherry Point would result in an estimated total increase of 2,870 persons in the region. Based on demographic data, approximately 520 persons would reside in the City of Havelock, 1,600 would reside in Craven County (excluding those residing in Havelock), and 530 would reside in Carteret County. The remaining persons would be distributed among other parts of the region.

According to data provided by the NCDEHNR, gross water usage for the region is estimated to be 72 gallons per person per day (GPD). Assuming an additional 520 persons would reside in the City of Havelock, the daily increase in water usage would be approximately 0.04 MGD. With an excess water well pumping capacity of approximately 1 MGD, a surplus storage capacity of 0.8 million gallons, and plans for the construction of a fifth groundwater well, the city would have adequate capacity to serve this new demand.

Assuming an additional 1,600 persons would reside in Craven County and 530 persons in Carteret County, the daily increases in water usage would be 0.12 MGD and 0.04 MGD, respectively. Because the Craven County water system only serves part of the county, the demand would be spread among county, municipal, and private water systems. For those people residing in areas serviced by the county's water system, there would be sufficient capacity for new demand. For areas outside these service regions, there would also be sufficient water capacity to support new demand; the Castle Hayne and Black Creek formations have good water quality and large water volumes.

As stated in Section 3.3.6.2, Carteret County does not operate a water system and the majority of residents rely on private well systems, which are permitted by NCDEHNR. Because demand would be distributed across the county, these systems would not be significantly impacted.

8.1.6.2 Wastewater System

As stated in Section 3.3.6.2, MCAS Cherry Point maintains a sewage treatment plant with a design flow capacity of 3.32 MGD and an NCNPDES permit discharge rate of 3.5 MGD. The wastewater treatment plant processes approximately 3 MGD of wastewater; therefore, excess capacity in the system is 0.32 MGD. Assuming wastewater generated equals 80% of the water consumed (ICMA 1988), approximately 0.05 MGD of additional

wastewater would be generated. Therefore, the station would have the capacity to handle the projected increase.

The City of Havelock wastewater treatment plant has a design flow of 1.5 MGD which is expected to be increased to between 2.25 and 2.5 MGD by January 1998. With a current average flow of 1.25 MGD, the city would have sufficient capacity to meet the 0.03 MGD in new demand associated with ARS 5.

Unincorporated areas of Craven and Carteret counties rely principally on septic tanks to provide wastewater treatment. Areas in municipalities or special sewer districts use central sewer systems for wastewater disposal. Because of the multiple methods and service providers for wastewater treatment, no individual system or method of wastewater treatment would be significantly impacted by ARS 5.

8.1.6.3 Stormwater

Under the North Carolina Coastal Zone Management Program, disturbance to 1 or more acres, or construction activities requiring a sediment control and erosion plan, are required to provide stormwater quality control designed to result in an 80% reduction in suspended particles prior to stormwater discharge from the site. Stormwater quality control facilities would be incorporated into the construction plans for the new facilities under ARS 5. Although the quantity of stormwater runoff would increase because of the construction of the new facilities, it would not have a significant impact on water resources.

Because the renovation projects would not add additional impervious surface, no quality control programs would be required and no stormwater impact would be expected. There is potential for the degradation of stormwater runoff due to additional aircraft operation activities; however, the station maintains a system of oil and water separators in potential areas of concern. In addition, through stormwater system upgrades and the enforcement of the station's Stormwater Pollution Prevention Plan, any additional stormwater runoff would not pose a significant impact.

8.1.6.4 Electrical

As stated in Section 3.2.6.4, the Carolina Power and Light Company supplies power directly to the MCAS Cherry Point, Slocum Village, Hancock Village, and the Staff Townhouse area. Although electric usage at the station sometimes approaches the peak capacity load of 42 megawatts and the 20-megawatt substation is approaching capacity limits, the station's electric system would be able to support the new demand created by implementation of ARS 5.

8.1.6.5 Heating

The proposed projects under ARS 5 would require alterations to the existing steam distribution system that services the core area only. Most of the proposed renovation and new construction sites are serviced by the steam distribution system, but a line or alternative heat source would need to be provided to the proposed child development center which is not within the serviced core area. The Central Heating Plant has adequate capacity to provide steam-generated heat and process steam as required.

8.1.6.6 Jet Fuel

The existing jet fuel distribution system would have sufficient capacity to support the additional aircraft (Toocker 1996).

8.1.6.7 Solid Waste Management

According to personal at the Tuscarora Landfill, the per capita solid waste generation rate for the region is 0.574 tons (0.521 metric tons) per person per year (Dietz 1996). Therefore, with a realignment of approximately 2,870 persons into the region under ARS 5, the increase in total solid waste generated is expected to be roughly 1,647 tons (1,497 metric tons) per year. Based on the existing available capacity a state mandate of 40% solid waste reduction, and expansion plans, ARS 5 would not significantly impact capacity at the Tuscarora Regional Landfill (Dietz 1996).

8.1.7 Transportation

ARS 5 would result in increases in traffic generated on and around MCAS Cherry Point. Based upon projected increases in station population, ARS 5 would create approximately 2,600 new daily automobile trips on station and regional roads. The following sections describe the implications of this increase in traffic loads.

8.1.7.1 Regional Road Network

Projections of traffic volumes on roadways within the area were generated based on an annual growth rate of 3.5%. Table 8.1-5 and Figure 8.1-4 display projected future traffic without the realignment activities, along with projections reflecting traffic generated by realignment activities under ARS 5. U.S. 70 between Jackson Road and NC 101 (Fontana Road) would degrade in LOS from C to E. NC 101 between Crocker/Roosevelt Road and Cunningham Boulevard would degrade from B to E. These changes would be considered

significant impacts. The Navy will work with the NCDOT to increase the LOS and reduce traffic impacts on these roads. All other roadways in the vicinity of MCAS Cherry Point exhibit sufficient capacity to handle the increased traffic volumes that would be associated with the realignment of five F/A-18 squadrons under ARS 5.

U.S. 70 between NC 101 to Cunningham Boulevard would degrade in LOS from B to C. NC 101 from Cunningham Boulevard to New Bern Road would degrade in LOS from A to B. This degradation would not be considered significant, because traffic flow would remain stable.

8.1.7.2 Station Road Network

Projected traffic resulting from ARS 5 would not significantly impact the operation of the on-station roadway network at MCAS Cherry Point. This network has sufficient excess capacity to accommodate the additional traffic that would be generated under ARS 5.

8.1.7.3 Planned Road Improvements

Modest traffic growth associated with ARS 5 would not affect the feasibility of planned road improvements in the vicinity of MCAS Cherry Point.

8.1.8 Noise

Long-term increases in noise exposure levels around MCAS Cherry Point would result in significant impacts from the increased aircraft operations associated with ARS 5.

The Navy conducted an aircraft noise study to examine the impacts resulting from operations of incoming F/A-18 aircraft under ARS 5 (Wyle Labs 1997). As with previous noise studies conducted at the station, it involved the use of DoD's NOISEMAP model to project Ldn contours in 1999, when realignment under ARS 5 would be completed. A discussion of Ldn as a relevant noise metric is presented in Section 3.1.8 and Appendix H. Figure 8.1-5 depicts projected AAD Ldn contours compared to existing AICUZ noise contours. As shown, both the 65 to 75 dB and 75 dB and greater Ldn contours cover greater areas than the respective AICUZ contours.

Table 8.1-6 compares the estimated area and population within AICUZ contours to projected 1999 noise contours under ARS 5. Although the population in the four-county area around MCAS Cherry Point has grown and is projected to grow by 13% by the year 2000, the 1990 census forms the basis of all noise analyses in the DEIS to maintain consistency in

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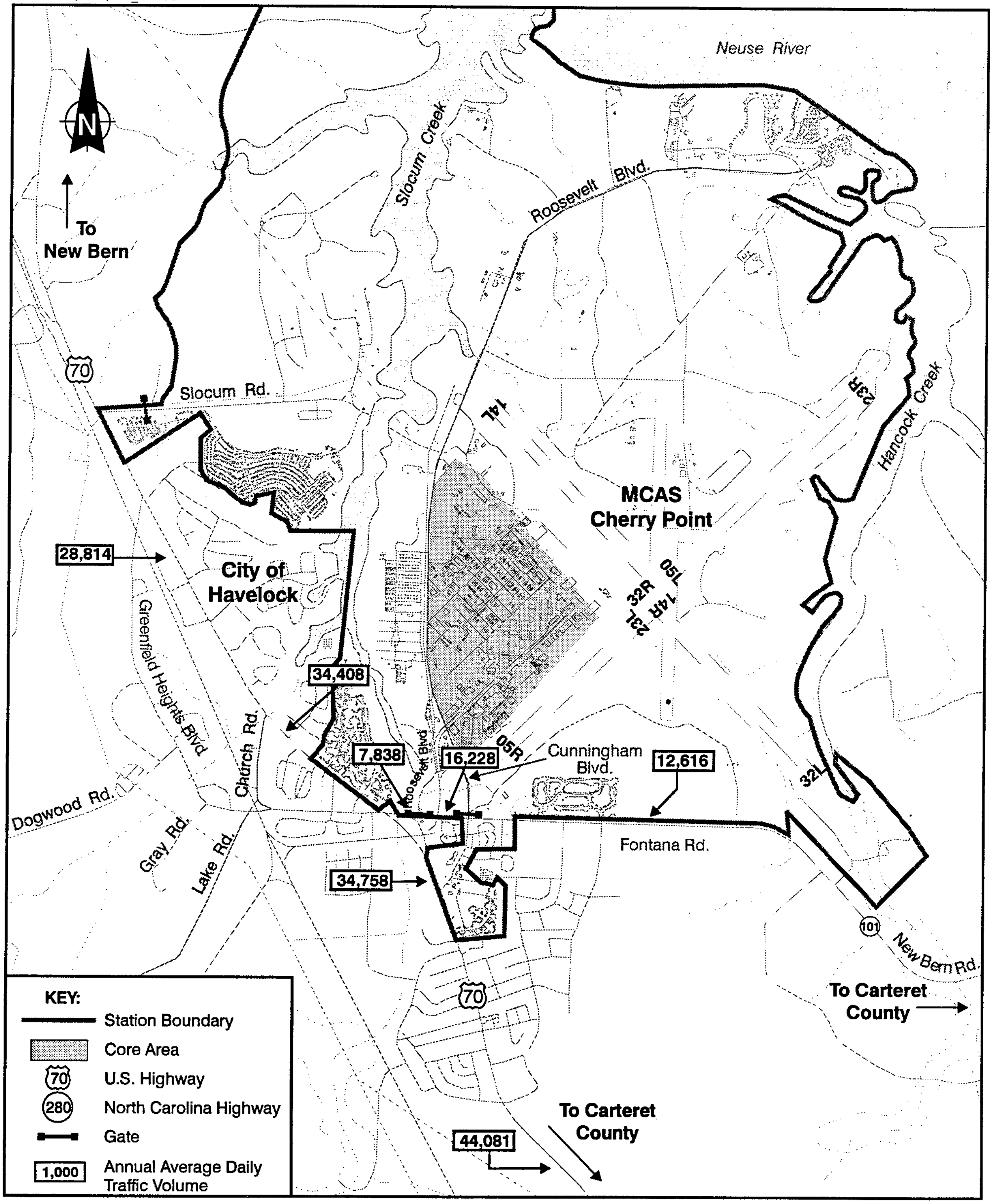


SCALE

0 1,183 2,366 Meters

0 3,881 7,762 Feet

Figure 8.1-4 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING MCAS CHERRY POINT FOLLOWING REALIGNMENT UNDER ARS 5

Table 8.1-5

PROJECTED TRAFFIC CONDITIONS ON ROADS IN THE VICINITY OF MCAS CHERRY POINT ASSOCIATED WITH ARS 5

Road	Segment	AADT Without Realignment 1999[a]	LOS	AADT With Realignment 1999[a]	LOS
U.S. 70	Greenfield Heights Blvd to Church Road	23,074	B	28,814	B
U.S. 70	Church Road to Jackson Road	28,668	B	34,408	B
U.S. 70	Jackson Road to NC 101 (Fontana Rd)	41,254	C	46,994	E
U.S. 70	NC 101 (Fontana Rd) to Cunningham Blvd	29,018	B	34,758	C
U.S. 70	Cunningham Blvd towards east (Carteret County)	38,341	C	44,081	C
NC 101 (Fontana Rd)	US 70 to Crocker/Roosevelt Road	2,098	B	7,838	B
NC 101 (Fontana Rd)	Crocker/Roosevelt Road to Cunningham Blvd	10,488	B	16,228	E
NC 101 (Fontana Rd)	Cunningham Blvd towards east (New Bern)	6,876	A	12,616	B

[a] These volumes have been projected using an annual 3.5% growth rate (U.S. Navy 1994).

Key:

A = Free-flow conditions.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds; however, low maneuverability.
E = Traffic at capacity of segment; unstable flows with little or no maneuverability.
F = Forced-flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
AADT = Annual Average Daily Traffic.
LOS = Level of service.

Table 8.1-6

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1988 AICUZ AND PROJECTED 1999 NOISE CONTOURS MCAS CHERRY POINT - ARS 5

	1988 AICUZ		1999 Noise Contours		New Area/Population Exposed Relative to 1988 AICUZ[a]	
Ldn	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	5,265 (2,130)	1,529	8,722 (3,531)	3,984	4,449 (1,801)	2,868
75 dB or greater	321 (130)	29	697 (282)	441	420 (170)	364
Total	5,586 (2,260)	1,558	9,419 (3,813)	4,425	4,869 (1,971)	3,232

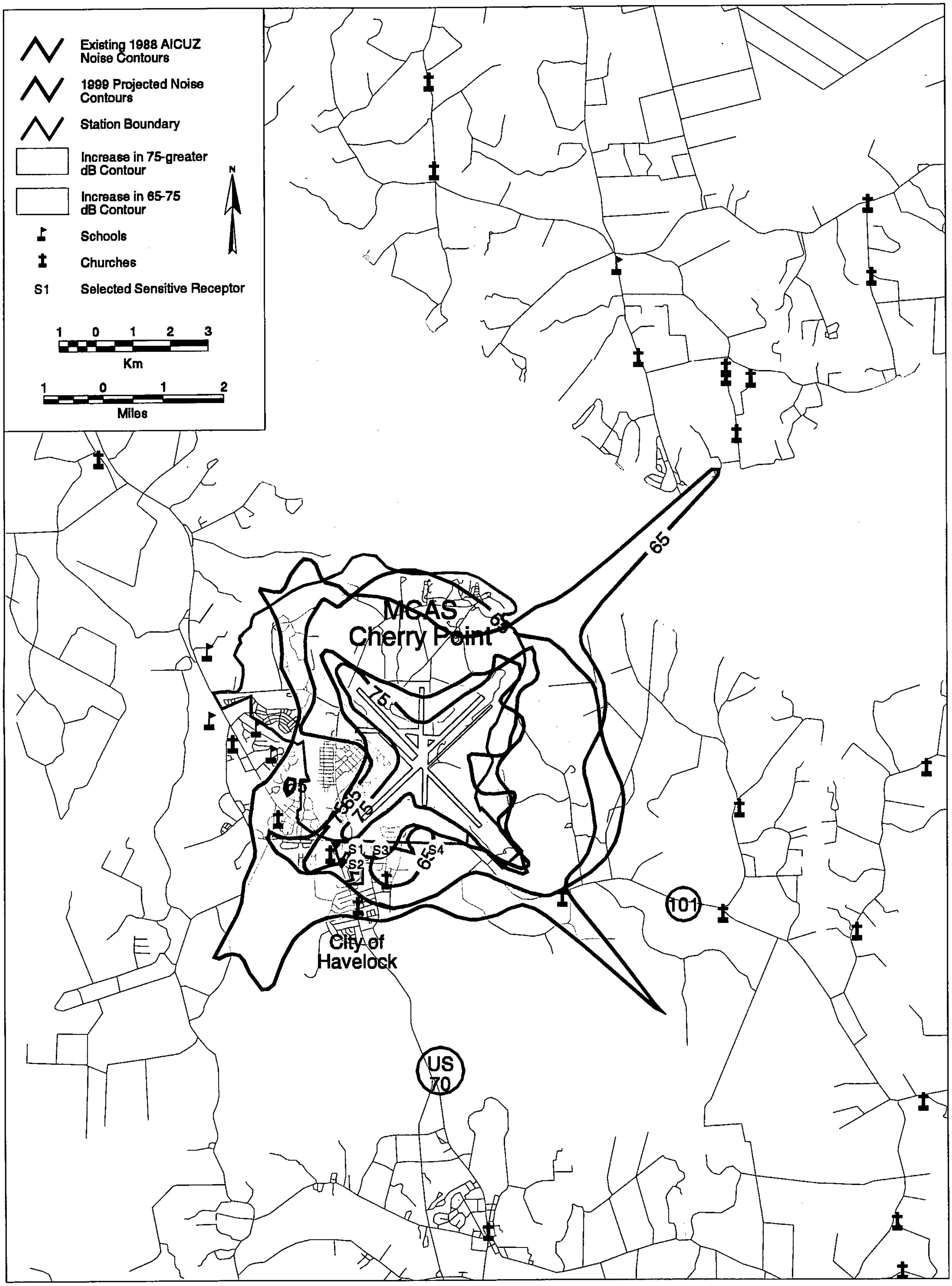
Note: Numbers exclude water areas.

a Represents only new area/population that previously were not exposed to listed noise levels under 1988 AICUZ. Does not equal the difference between 1988 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.



Source: LANTDIV 1988, Wyle Labs 1997

Figure 8.1-5
ARS 5 - Comparison of Existing and Projected 1999 Average Annual Day Noise Contours
MCAS Cherry Point

all these analyses. The projected 1999 65 to 75 dB noise contour for ARS 5 would cover an area of 8,722 acres (3,531 hectares), with an estimated population of 3,984 people. The 75 dB or greater contour would cover an area of 697 acres (282 hectares), with an estimated population of 441 people (Wyle Labs 1997). New areas exposed to an Ldn of 65 to 75 dB would cover 4,449 acres (1,801 hectares) with an estimated population of 2,868 persons. New areas exposed to an Ldn of 75 dB or greater would cover 420 acres (170 hectares), with an estimated population of 364 persons. A discussion of human health noise-related impacts and protection standards is presented in Section 4.8. Table 8.1-7 presents the decrease in area and population noise exposure relative to the 1988 AICUZ. An estimated population of 61 people would experience a reduction of noise levels due to existing flight tracks and runway utilization.

Table 8.1-7

DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE RELATIVE TO 1988 AICUZ MCAS CHERRY POINT - ARS 5

Reduction in Ldn	Area in Acres (Hectares)	Estimated Population
75+ to 65 - 75 dB	-67 (27)	-6
65 - 75 to <65 dB	-641 (259)	-55
Total	-708 (286)	-61

Note: Numbers exclude water areas.

Key:

Ldn = Day-night average sound level.

Table 8.1-8 presents the projected site-specific Ldn at schools located within the 65 dB or greater Ldn contour. The projected impacts at these locations vary, ranging from a 1 to 5 dB increase over existing conditions (Wyle Labs 1997). Schools are considered compatible with outside noise levels between 65 and 75 Ldn only if they have sufficient sound attenuation to reduce interior noise levels to approximately 45 dB. To analyze potential noise impacts to schools, the school-day (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) Leq was calculated for 1999 conditions for those schools expected to be within the 65 dB or greater Ldn (see Table 8.1-8). Use of central air conditioning systems in association

with closed windows normally reduces noise levels by approximately 25 dB. Therefore, school sites with a 1999 exterior Leq of 70 dB or less would likely experience minimal interference. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at those schools of particular concern.

Table 8.1-8

SCHOOLS WITHIN PROJECTED 1999 NOISE CONTOURS GREATER THAN 65 Ldn

Identification Number[a]/Name		1997 Ldn (dB)	1999 Ldn (dB)	1999 Leq (dB)
S1	Havelock Elementary	74	76	76
S2	Havelock Middle	73	75	75
S3	Havelock High	76	77	77
S4	Roger Bell Elementary	66	71	68

Note: One school located near the departure end of Runway 32R is currently under construction.

[a] Schools are shown on Figure 8.1-5.

Key:

dB = Decibel.
Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

The maximum sound levels of typical F/A-18 events similar to those that would be conducted at MCAS Cherry Point are shown in Table 8.1-9. Levels for AV-8s are also presented for comparative purposes. The anticipated number of average daily operations by event is presented in Table 8.1-10.

The noise contours presented in Figure 8.1-5 represent the projected flight operation plan. MCAS Cherry Point continually evaluates noise mitigation options to minimize impacts on the local community. These include evaluations of:

- Arrival and departure procedures;
- Airfield hours of operation;

Table 8.1-9 MAXIMUM SOUND LEVELS AT RECEPTORS WITH AIRCRAFT AT 1,000 FEET AGL (decibels)		
	F/A-18	AV-8
Departures	108	85
Arrivals	104	88
Touch-and-Go	97	91
FCLP	97	NA

Table 8.1-10 MCAS CHERRY POINT PROJECTED AVERAGE DAY OPERATIONS FOR SELECTED F/A-18 EVENTS	
Departures	13
Arrivals	13
Touch-and-Go[a]	13
FCLP[a]	18

[a] Touch-and-go and FCLP sorties equal two operations each.

- Pattern altitudes;
- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

MCAS Cherry Point would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation.

8.1.9 Air Quality

8.1.9.1 Air Regulations

Air quality is governed by the Clean Air Act and its implementing regulations. The primary regulations affecting ARS 5 at MCAS Cherry Point are the NAAQS. The station is

located in the Southern Coastal Plain AQCR of North Carolina. This AQCR is designated attainment or unclassified/attainment for all criteria pollutants.

8.1.9.2 General Conformity Rule

As stated in Section 3.3.9, the area around MCAS Cherry Point is classified as attainment for all criteria pollutants. Therefore, air emissions at the station associated with ARS 5 are exempt from the General Conformity Rule.

8.1.9.3 Projected Emissions at MCAS Cherry Point

Projected emissions for MCAS Cherry Point are presented in Table 8.1-11. An increase in air pollutant emissions is projected to occur primarily due to increased flight activity at MCAS Cherry Point and maintenance requirements (engine testing) for the five additional squadrons. Aircraft operation projections for 1999 (ATAC 1997) and emission factors and methods described in Appendix E were used to project emissions.

Some stationary source emissions would increase due to the additional squadrons. A Title V Air Permit to Operate issued by the NCDEHNR governs emissions from stationary sources at MCAS Cherry Point. There may be emission increases under ARS 5 that would require a modification of MCAS Cherry Point's Title V permit to include provisions for increased emissions from aircraft maintenance activity (stationary sources) due to the basing of five additional squadrons.

Estimated emissions in 1999 for aircraft operations at MCAS Cherry Point are 324 tons per year of VOCs, 332 tons per year of NO_x, 1,141 tons per year of CO, 41 tons per year of SO_2, and 131 tons per year of PM_{10}. Stationary sources at Cherry Point contribute 32 tons per year of VOCs, 205 tons per year of NO_x, 71 tons per year of CO, 450 tons per year of SO_2, and 21 tons per year of PM_{10}.

The construction requirements under ARS 5 for MCAS Cherry Point are presented in Section 2.4. The projects consists of new buildings, expansion/renovation of existing buildings on base, additional hangar space, a new parallel runway, taxiways, and aprons. Construction emission calculation methods presented in Appendix A of Appendix E (Air Conformity Determination) were followed for these construction projects. All construction projects are assumed to occur in a single year (1998). The total emissions by pollutant are: 10 tons of VOCs, 97 tons of NO_x, 10 tons of SO_2, 32 tons of CO, and 9 tons of PM_{10}. These emissions are not cumulative with projected emissions from aircraft and other base operations in 1999.

Table 8.1-11

1999 AIR EMISSIONS SUMMARY FOR MCAS CHERRY POINT UNDER ARS 5
(tons per year)

Source Type	1999				
	VOCs	NO_x	CO	SO_2	PM_{10}
Mobile Sources					
Aircraft	324.29	331.80	1,140.70	40.80	130.89
GSE	0.06	0.73	0.16	0.05	0.05
Maintenance run ups	8.36	14.73	22.21	0.44	5.11
Total Mobile	332.72	347.26	1,163.07	41.29	136.05
Stationary Sources					
Boiler	0.93	190.52	60.11	449.48	11.68
Generators	0.35	4.63	1.26	0.54	0.22
Engine test cells	2.76	9.95	9.78	0.33	6.13
APU test cell	0.00	0.02	0.02	0.00	0.00
Fuel storage and handling	7.98	0.00	0.00	0.00	0.00
Painting	6.05	0.00	0.00	0.00	0.18
Parts cleaning	6.70	0.00	0.00	0.00	0.00
Miscellaneous	7.04	0.00	0.07	0.01	3.15
Total Stationary	31.80	205.12	71.24	450.37	21.36
Total Annual	364.51	552.38	1,234.31	491.66	157.41

8.1.9.4 Total Net Projected Emissions

The net change in emissions from 1997 to 1999 is shown in Table 8.1-12. Emissions increase 79 tons per year for VOCs, 73 tons per year for NO_x, 205 tons per year for CO, 5 tons per year for SO_2, and 11 tons per year for PM_{10}. These emission increases are minor when compared with allowable emission increases for permitting requirements in attainment areas. Generally, stationary sources emitting minor amounts of pollutants are not subject to rigorous air quality permitting because these emissions are assumed to not significantly affect air quality in the region surrounding the station.

Table 8.1-12

**NET CHANGE IN AIR EMISSIONS BETWEEN 1997 AND 1999
MCAS CHERRY POINT - ARS 5
(tons per year)**

Year	VOCs	NO_x	CO	SO_2	PM_{10}
1997	285.54	479.32	1,029.67	486.81	146.71
1999	364.51	552.38	1,234.31	491.66	157.41
Net Change: 1997 to 1999	78.98	73.06	204.64	4.85	10.70

8.1.10 Topography, Geology, and Soils

8.1.10.1 Topography

The proposed construction and operations under ARS 5 would not impact topography.

8.1.10.2 Geology

The proposed construction and operations under ARS 5 would not impact geologic resources underlying the station.

8.1.10.3 Soils

The overall effect on soils at the proposed project sites under ARS 5 would be minor and due primarily to short-term construction activities. Temporary impacts on soils would include compaction and rutting by vehicular traffic and potential erosion of soils during the construction phase of the project. These will be lessened through implementation of standard soil erosion and sediment control measures.

8.1.11 Water Resources

8.1.11.1 Surface Water

Most of the proposed project sites are located in the core area and along the existing flight line. The surface water impacts of these projects would be minimal.

Potential surface water-quality impacts may result from increases in oil, grease, metals, and particulates in the stormwater runoff. With the increase in number of aircraft that are housed and maintained at the station, the presence of these contaminants on the paved surfaces would likely increase. Management of point and nonpoint stormwater discharges would be accomplished through the continued implementation of the station's Stormwater Pollution Prevention Plan and an NPDES permit for stormwater discharges. Construction of the parallel runway, however, would directly impact two tributaries of Hancock Creek. The tributaries would likely be culverted to facilitate drainage, and the area would be filled to support construction of the runway surface. The primary impact would be loss of natural channel substrate, which would further impact the invertebrate and fish populations of the tributaries. Loss of the wetlands associated with the tributaries would reduce the filtering capacity for surface runoff of the newly constructed runway, thereby impacting the water quality of Hancock Creek. To mitigate these impacts, a stormwater management plan will be prepared in conjunction with a Clean Water Act Section 401 permit application.

8.1.11.2 Groundwater

No effects to the area's groundwater resources are expected as a result of the ARS 5. Neither the availability of groundwater in the area nor the quality of the water withdrawn would be affected.

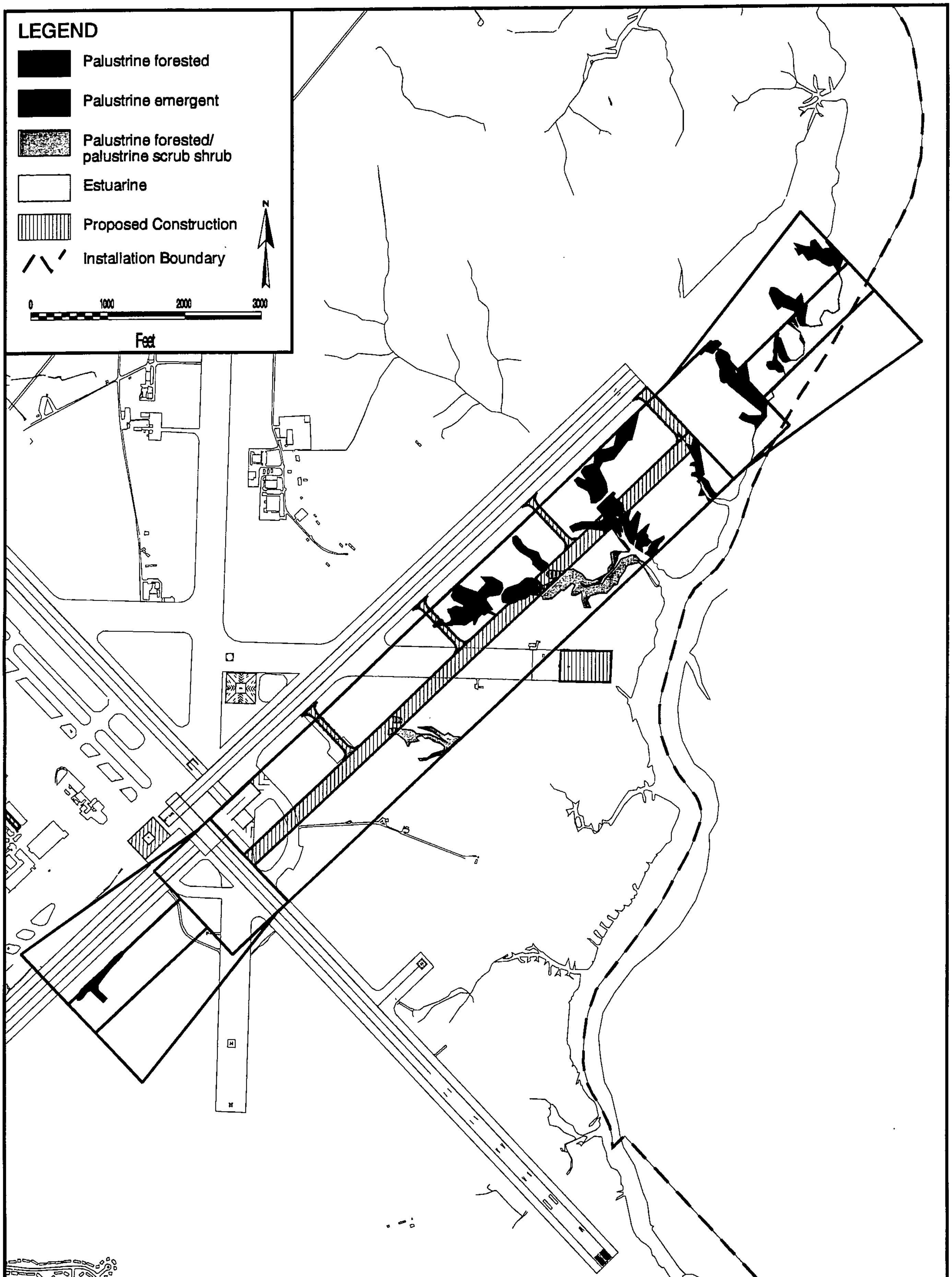
8.1.11.3 Wetlands

Most of the proposed projects under ARS 5 would occur in developed portions of the station. Wetland impacts resulting from the implementation of ARS 5 would be limited to the construction of the parallel runway (see Figure 8.1-6). A total of 48.81 acres (19.8 hectares) of palustrine wetlands falls within the proposed footprint of the new runway and associated clear zones. Additionally, 50.59 acres (20.5 hectares) of estuarine area of Hancock Creek and two small tributaries fall within the footprint. However, taking into consideration that herbaceous vegetation and estuarine areas would not be impacted in the Type II and III clear zones or in transition zones, impacts to the estuarine environment would be minimal.

Wetlands potentially impacted from construction activities in the runway footprint, primary surface area, and Type I clear zone total 45.38 acres, including 17.13 acres of PEM, 11.92 acres of PFO, 10.21 acres of PFO/PSS, and 6.12 acres of estuarine area. However, it is anticipated that actual wetland impacts would be significantly reduced depending on the final runway design. Culverts and bridges could be used where appropriate, and ground disturbance would be minimized wherever possible. Only 0.10 acre of the estuarine areas falls within the actual runway footprint. Maintenance of natural drainage patterns adjacent to the runway and slight modification of the Type I clear zone to eliminate filling within Hancock Creek would further reduce impacts on the estuarine environment. Assuming no ground disturbance in the Type II and Type III clear zones, impacts in these zones would be reduced to the conversion of 7.17 acres of PFO to emergent or maintained scrub-shrub wetland. Any vegetation removal in the Type II and III clear zones would be accomplished through nonmechanized means (i.e., hand cleared). The construction of the runway surface and clear area would represent a long-term loss in wetland acreage.

Under the authority of Executive Order 11990, *Protection of Wetlands*, federal agencies are required to adopt a policy "to avoid to the extent possible the long-and short term adverse impacts associated with the destruction and modification of wetlands and to avoid the direct and indirect support of new construction in wetlands whenever there is a practicable alternative." In addition, implementation of USACE/USEPA guidelines for wetland mitigation provide a hierarchy of avoidance, minimization, and compensation. Mitigation compensation is accepted only after the satisfactory demonstration of reasonable avoidance and minimization. Preliminary design estimates indicate that construction of the parallel runway could result in the permanent loss of wetlands including 0.10 acre of estuarine zone. Final design development may further reduce this impact, and efforts would focus on avoiding or minimizing impacts to wetlands. Complete avoidance of wetlands is not possible under this alternative because airfield design criteria require separation distances and associated clear zones.

When avoidance is not feasible, impacts would need to be minimized. As noted above, wetland impacts would result from construction activities associated with the parallel runway. The present alignment represents the minimum facility size necessary in terms of safety and operations. The opportunity exists, however, to implement appropriate mitigation measures to minimize/neutralize adverse impacts resulting from construction of these facilities. For example, short-term impacts could be mitigated by establishing proper erosion control structures at the edge of the impact area to minimize sedimentation flow into adjacent wetland areas. Appropriate construction mitigation techniques (e.g., erosion and



Source: Geo Marine, Inc. 1995
USFWS NWI

Figure 8.1-6
Wetlands Within Proposed Development Areas at MCAS Cherry Point

sedimentation control) would be used to minimize impacts to wetlands. In addition, when estuarine open water zones intersect the primary surface zones of the footprint grading, operations would maintain the existing drainages.

Compensation will be required for long-term impacts resulting from lost wetland acreage that cannot be avoided or minimized. Compensation/mitigation can be accomplished through creation of new wetlands or enhancement, restoration, or preservation of existing wetlands. Potential mitigation includes creation and enhancement of existing wetland areas at other locations on base or use of mitigation banks in North Carolina. These activities would need to be incorporated into a wetland mitigation plan, developed in consultation with the USACE and North Carolina Division of Coastal Management, and approved by USACE via the Clean Water Act Section 404 permit process. USACE does not have any established mitigation ratios in terms of acre-for-acre replacement. Instead, they require that a functional analysis of the impacted wetlands be conducted to determine appropriate mitigation. Mitigation is considered appropriate and acceptable if, based on an approved evaluation technique, determined functions and values for the proposed mitigation/replacement wetlands are greater than or equal to the impacted wetland area.

8.1.12 Terrestrial Environment

8.1.12.1 Vegetation

Impacts to vegetation would be minor for proposed projects in the core area of the base. Impacts to vegetation at the proposed site of the child development center include the loss of mixed pine hardwood and upland hardwood. However, because the proposed site is only 0.2 acre (0.08 hectare) in size and large areas of similar habitat are available on the base, the loss of forest vegetation is not considered significant.

Construction of the proposed parallel runway would require clearing of approximately 44.3 acres (17.9 hectares) for paved surfaces and the safety clearance zones. Vegetation within the primary surface and clear zone I would be actively maintained as low grasses (i.e, lawn or emergent wetland). Within clear zones II and III, removal of all large woody vegetation would be necessary, affecting forested areas. However, areas of shrub-scrub or emergent vegetation would not be impacted. Much of the area for the proposed runway and associated clear zones is currently maintained in low grasses for the clearance zones of the existing runways and would not be affected. Loss of loblolly pine forest would occur in stands along Hancock Creek.

8.1.12.2 Wildlife

Most of the projects proposed under ARS 5 would not result in significant effects to wildlife resources. Areas proposed for development in the core area currently provide limited habitat for wildlife, except for those species tolerant of urban environments. These species would disperse to surrounding areas during the construction phase of the project. Following completion of construction, these species would reinhabit the site.

Construction of the parallel runway, facility relocation site, and child development center would likely result in direct mortality of less mobile species such as small mammals, reptiles, and amphibians. Indirect effects on individuals of more mobile species would occur because of permanent loss of habitat associated with new construction. However, large areas of habitat similar to those affected are available on the base; therefore, overall impacts on wildlife populations at the base would be minor.

8.1.12.3 Threatened and Endangered Species

Threatened or endangered species identified on the station in the vicinity of the proposed project areas include the American alligator, the bald eagle, spring goldenrod, and Chapman's sedge. Prior to construction, a threatened and endangered species survey will be conducted after consultation with USFWS to identify the locations of any threatened and endangered plant species as well as habitat for the American alligator and the bald eagle. If necessary, a mitigation plan will be developed in coordination with USFWS and appropriate North Carolina state agencies.

8.1.13 Cultural Resources

8.1.13.1 Archaeological Resources

Under ARS 5, the construction of the AIMD facility, flight simulator, flight line medical clinic, and parking apron expansion would take place in a highly developed section of MCAS Cherry Point (i.e., the core area and the existing flight line). This area of extensive prior disturbance would also be used for relocation of TACAN air surveillance radar, Harrier Pad, and high-power run-up pads and support buildings. These projects would not affect significant archaeological resources.

The area of the proposed relocation facility in proximity to Hancock Creek and the area of the proposed parallel runway may contain currently unknown archaeological sites. Any such sites would sustain an adverse effect in the course of the construction operations. Proposed mitigative measures include an archaeological survey of these two locations to

identify and delineate any sites. If subsurface archaeological resources are identified they will be evaluated as to their NRHP eligibility.

The construction of the proposed child development center corresponds to a previously surveyed location; this area does not contain any archaeological sites, and no additional mitigative measures are necessary.

8.1.13.2 Architectural Resources

Under ARS 5, the high-power run-up support buildings would be demolished. These structures are not NRHP-eligible, and their demolition requires no mitigative measures. Similarly, renovations/additions to Buildings 1665 and 1700 would have no affect on NRHP-eligible resources.

Hangars 130 and 131 also have been determined to lack merit for NRHP listing. The North Carolina Division of Archives and History is currently reviewing this determination.

8.1.14 Environmental Contamination

8.1.14.1 Hazardous Materials and Waste Management

Realignment of five F/A-18 squadrons under ARS 5 would increase the use of hazardous materials and the generation of hazardous waste at MCAS Cherry Point because of the maintenance and repair activities associated with the aircraft. However, MCAS Cherry Point would continue to manage hazardous waste in compliance an RCRA Part B Permit, and Air Station Order 5090.5, Handling, Transfer, and Disposal of Hazardous Materials and Hazardous Waste.

The amount of increased hazardous waste generated is estimated to be approximately 19,000 lbs/year (8,636 kilograms/year), following the assumptions stated under ARS 3. The amount estimated is less than 1% of the total amount generated by the station (including the tenant activities) in 1995. The increase in waste generated is not considered significant, although the RCRA Part B permit would need to be modified to include locations of any additional hazardous waste accumulation areas.

8.1.14.2 Installation Restoration Program

Investigative and remedial activities under the IRP may impact aircraft activities of the F/A-18 squadrons because (1) the location of the hangars proposed for use by the aircraft is within OU-1 and 2 remedial activities at OU-1 will likely extend beyond the year 1999 (Brown & Root Environmental 1996b). However, this impact would not be significant

because aircraft activities would be able to be conducted simultaneously with the investigative and remedial activities under the IRP. Construction of the parallel runway would traverse two OUs under the IRP. OU-6 is still under investigation, although OU-10 is proposed for no further action. Prior to construction, the Navy would coordinate with the EPA and the State of North Carolina to obtain a Record of Decision on these OUs, and if the remedial action is not completed, develop and implement a worker safety plan for construction workers.

8.2 Environmental Consequences and Mitigation Measures: ARS 5 at NAS Oceana

8.2.1 Airfield Operations

Airfield operations at NAS Oceana under ARS 5 would be 11% less than those experienced under ARS 1. Table 8.2-1 presents projected airfield operations for ARS 5 derived from the NASMOD analysis for the station (ATAC 1997). Approximately 210,035 annual operations would be conducted at NAS Oceana. This represents a 93% increase over 1997 operations. Approximately 121,948 operations would be conducted at NALF Fentress. This would represent a 17% increase over 1997 operations. As with the other alternatives, these operations could be reasonably accommodated at these facilities (ATAC 1997).

8.2.2 Military Training Areas

8.2.2.1 Military Training Routes

Projected aircraft operations and noise levels along MTRs under ARS 5 are presented in Table 8.2-2. Operations along all MTRs would grow to 8,587, a 10% increase over 1997 levels. As under ARS 1, no MTR would experience a significant increase in noise levels (ATAC 1997; Wyle Labs 1997).

8.2.2.2 Warning Areas

Aircraft operations in warning areas adjacent to NAS Oceana under ARS 5 would be similar to those under ARS 1 (see Table 8.2-3). As under ARS 1, the overall operational efficiency of these airspace components would not be adversely impacted by implementation of ARS 5 (ATAC 1997).

8.2.2.3 Military Operating Areas

Navy and Marine Corps operations in the Stumpy Point MOA under ARS 5 would be less than those under ARS 1 (see Table 8.2-4). Total annual operations would decrease from 56 to 24.

8.2.2.4 Restricted Areas

Aircraft operations in restricted areas adjacent to NAS Oceana under ARS 5 would be similar to those under ARS 1 (see Table 8.2-5). As under ARS 1, the overall operational efficiency of these areas would not be impacted by implementation of ARS 5 (ATAC 1997).

Table 8.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 5

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
NAS Oceana						
F-14 Fleet	Departure	13,225	12,178	1,097	13,275	
	Full Stop Visual Landing	12,700	11,308	1,429	12,737	
	Full Stop Instrument Landing	514	376	151	527	
	Visual Touch-and-Go/Low Approach	20,396	19,794	1,010	20,804	
	Instrument Touch-and-Go/Low Approach	570	488	60	548	
	Field Carrier Landing Practice	0	576	160	736	
	TOTAL	**47,405**	**44,720**	**3,907**	**48,627**	
F-14 FRS	Departure	6,947	6,574	420	6,994	
	Full Stop Visual Landing	6,308	5,938	404	6,342	
	Full Stop Instrument Landing	639	268	384	652	
	Visual Touch-and-Go/Low Approach	27,456	25,680	904	26,584	
	Instrument Touch-and-Go/Low Approach	5,234	3,670	1,596	5,266	
	Field Carrier Landing Practice	0	0	0	0	
	TOTAL	**46,584**	**42,130**	**3,708**	**45,838**	
F/A-18 Fleet	Departure	0	8,224	729	8,953	
	Full Stop Visual Landing	0	7,374	997	8,371	
	Full Stop Instrument Landing	0	455	139	594	
	Visual Touch-and-Go/Low Approach	0	14,170	936	15,106	
	Instrument Touch-and-Go/Low Approach	0	1,288	356	1,644	
	Field Carrier Landing Practice	0	220	480	700	
	TOTAL	**0**	**31,731**	**3,637**	**35,368**	

Table 8.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 5

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
F/A-18 FRS	Departure	0	8,062	473	8,535	
	Full Stop Visual Landing	0	6,918	700	7,618	
	Full Stop Instrument Landing	0	623	294	917	
	Visual Touch-and-Go/Low Approach	0	36,272	2,330	38,602	
	Instrument Touch-and-Go/Low Approach	0	4,476	640	5,116	
	Field Carrier Landing Practice	0	240	160	400	
	TOTAL	**0**	**56,591**	**4,597**	**61,188**	
Adversary	Departure	839	2,289	59	2,348	
	Full Stop Visual Landing	828	2,325	0	2,325	
	Full Stop Instrument Landing	5	23	0	23	
	Visual Touch-and-Go/Low Approach	436	1,496	0	1,496	
	Instrument Touch-and-Go/Low Approach	168	164	0	164	
	TOTAL	**2,276**	**6,297**	**59**	**6,356**	
Transient Jet	Departure	967	947	20	967	
	Full Stop Visual Landing	724	708	14	722	
	Full Stop Instrument Landing	243	243	2	245	
	Visual Touch-and-Go/Low Approach	1,078	1,006	22	1,028	
	Instrument Touch-and-Go/Low Approach	836	804	30	834	
	TOTAL	**3,848**	**3,708**	**88**	**3,796**	
Transient Prop	Departure	1,642	1,633	31	1,664	
	Full Stop Visual Landing	1,171	1,171	16	1,193	
	Full Stop Instrument Landing	471	463	8	471	

Table 8.2-1

1999 BASIC OPERATIONS AT NAS OCEANA AND NALF FENTRESS UNDER ARS 5

Aircraft Category	Operation Type	1997 Total Operations	Projected 1999 Airfield Operations			Percent Change
			Day 0700-2200	Night 2200-0700	Total	
	Visual Touch-and-Go/Low Approach	2,890	2,858	52	2,910	
	Instrument Touch-and-Go/Low Approach	2,610	2,582	42	2,624	
	TOTAL	8,784	8,713	149	8,862	
	AIRFIELD TOTAL	108,897	193,890	16,145	210,035	93
NALF Fentress						
F-14 Fleet	Field Carrier Landing Practice	38,640	21,345	16,655	38,000	
F-14 FRS	Field Carrier Landing Practice	23,280	14,628	9,012	23,640	
F/A-18 Fleet	Field Carrier Landing Practice	0	10,826	6,734	17,560	
F/A-18 FRS	Field Carrier Landing Practice	0	17,356	6,836	24,192	
E-2 Fleet	Departure	168	0	0	0	
	Full Stop Visual Landing	168	0	0	0	
	Field Carrier Landing Practice	16,464	8,558	8,242	16,800	
E-2 FRS	Departure	616	0	0	0	
	Full Stop Visual Landing	616	0	0	0	
	Field Carrier Landing Practice	16,368	10,307	7,293	17,600	
C-2 Fleet	Departure	112	0	0	0	
	Full Stop Visual Landing	112	0	0	0	
	Field Carrier Landing Practice	8,124	7,772	576	8,348	
	AIRFIELD TOTAL	104,668	90,792	55,348	146,140	40

Source: ATAC 1997.

Table 8.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS
ARS 5

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 5			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
VR-0073	A-6	5	0	0	0		52	53
	AV-8B	199	475	2	477			
	EA-6B	39	38	1	39			
	F-14	61	28	0	28			
	F-15	601	589	12	601			
	F-16	72	72	0	72			
	F/A-18	6	6	0	6			
	T-38	4	4	0	4			
	Total	**987**	**1,212**	**15**	**1,227**	**24**		
VR-0085	AV-8B	0	30	1	31		<50	<50
	F-14	50	126	0	126			
	F-15	464	464	0	464			
	F-16	19	19	0	19			
	F/A-18	11	107	3	110			
	EA-6B	0	83	0	83			
	KC-130	0	32	0	32			
	Total	**544**	**861**	**4**	**865**	**59**		
VR-1040	A-10	9	9	0	9		52	52
	AV-8B	101	30	1	31			
	KC-130	28	32	0	32			
	EA-6B	78	83	0	83			
	F-14	0	126	0	126			
	F-16	520	520	0	520			
	F/A-18	18	58	0	58			
	Total	**754**	**907**	**4**	**911**	**21**		
VR-1043	A-6	405	0	0	0		55	<50
	AV-8B	64	23	0	23			

Table 8.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 5

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 5			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	KC-130	32	32	0	32			
	EA-6B	74	74	0	74			
	F-15	28	28	0	28			
	F-16	115	115	0	115			
	F/A-18	37	37	0	37			
	Total	**755**	**309**	**0**	**309**	**-59**		
VR-1046	A-10	9	9	0	9		57	<50
	A-6	363	0	0	0			
	AV-8	78	243	4	247			
	EA-6B	37	21	16	37			
	F-15	41	41	0	41			
	F-16	9	9	0	9			
	F/A-18	92	190	2	192			
	F-4	9	9	0	9			
	T-2	4	4	0	4			
	Total	**642**	**526**	**22**	**548**	**-15**		
VR-1752	A-4	5	5	0	5		50	<50
	A-6	179	0	0	0			
	AV-8B	6	30	1	31			
	C-17	1	1	0	1			
	KC-130	10	32	0	32			
	EA-6B	167	83	0	83			
	F-111	5	5	0	5			
	F-14	19	126	0	126			
	F-15	191	183	8	191			
	F-16	3	3	0	3			
	F/A-18	23	58	0	58			

Table 8.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 5

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 5			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	TA-4	3	3	0	3			
	Total	612	578	12	590	-4		
VR-1753	A-6	418	0	0	0		51	50
	AV-8B	34	32	2	34			
	C-2	7	7	0	7			
	EA-6B	27	25	2	27			
	F-14	280	753	0	753			
	F-15	144	142	2	144			
	F-16	174	170	4	174			
	F/A-18	8	422	53	475			
	S-3	2	2	0	2			
	Total	1,094	1,553	63	1,616	48		
VR-1754	A-6	134	0	0	0		<50	<50
	CH-53	7	7	0	7			
	EA-6B	69	83	0	83			
	F-14	31	126	0	126			
	F-15	81	75	6	81			
	F-16	3	3	0	3			
	F/A-18	125	107	3	110			
	AV-8B	0	30	1	31			
	KC-130	0	32	0	32			
	Total	450	463	10	473	-6		
VR-1758	A-4	10	10	0	10		56	53
	A-6	448	0	0	0			
	AV-8B	22	30	1	31			
	B-1	7	7	0	7			
	B-52	1	1	0	1			

Table 8.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 5

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 5			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
	EA-6B	139	83	0	83			
	F-14	125	126	0	126			
	F-15	188	184	4	188			
	F-16	8	8	0	8			
	F/A-18	14	58	0	58			
	KC-130	0	32	0	32			
	Total	**962**	**588**	**8**	**596**	**-38**		
VR-1759	A-6	114	0	0	0		<50	<50
	AV-8B	17	30	1	31			
	EA-6B	11	83	0	83			
	F-14	27	126	0	126			
	F-15	9	9	0	9			
	F/A-18	3	107	3	110			
	KC-130	0	32	0	32			
	Total	**181**	**387**	**4**	**391**	**116**		
VR-1074	A-6	17	0	0	0		52	52
	AV-8B	196	361	14	375			
	EA-6B	34	34	0	34			
	F-14	8	8	0	8			
	F-15	403	403	0	403			
	F-16	12	12	0	12			
	F/A-18	16	16	0	16			
	Total	**686**	**834**	**14**	**848**	**24**		

Table 8.2-2

PROJECTED 1999 MILITARY TRAINING ROUTE SORTIES AND NOISE LEVELS ARS 5

MTR	Aircraft Type	1997 Sorties	Projected 1999 Sorties ARS 5			% Change	1997 Maximum Ldnmr	1999 Maximum Ldnmr
			Day	Night	Total			
IR-0714	A-6	74	0	0	0		<50	<50
	EA-6B	99	17	82	99			
	F/A-18	0	110	5	115			
	Total	173	127	86	213	23		
Total All MTRs		7,840	8,345	242	8,587	10	NA	NA

Source: ATAC 1997; Wyle Labs 1997.

Table 8.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS AND MILITARY OPERATING AREAS ARS 5

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 5)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
TACTS Range							
F-14 (NAS Oceana Fleet)	2,869	47	2,916	1,942	31	1,973	
F-14 (NAS Oceana FRS)	543	0	543	551	0	551	
F/A-18 (NAS Oceana Fleet)	0	0	0	1,992	25	2,017	
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	536	0	536	
F/A-18 (NAS Oceana FRS)	0	0	0	153	0	153	
Adversary Aircraft	612	14	626	1,724	19	1,743	
Air Force Jets	704	11	715	421	14	435	
Total	**4,728**	**72**	**4,800**	**7,319**	**89**	**7,408**	**54**
W-72 (exclusive of TACTS Range)							
F-14 (NAS Oceana Fleet)	2,942	58	3,000	3,588	56	3,644	
F-14 (NAS Oceana FRS)	2,739	0	2,739	2,762	0	2,762	
F/A-18 (NAS Oceana Fleet)	0	0	0	2,830	83	2,913	
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	262	40	302	
F/A-18 (NAS Oceana FRS)	0	0	0	4,472	76	4,548	
F/A-18 (Marine Corps)	75	0	75	75	0	75	
KC-130 (MCAS Cherry Point FRS)	4	0	4	6	0	6	
Adversary Aircraft	121	0	121	489	0	489	
Other Navy Aircraft	2,771	204	2,975	2,722	203	2,975	
Air Force Jets	1,323	0	1,323	1,330	0	1,330	
Other Air Force Aircraft	69	41	110	70	40	110	
Coast Guard Aircraft	46	33	79	46	33	79	
Contractor	876	0	876	876	0	876	
Civilian	34	37	71	33	38	71	
Total	**11,000**	**373**	**11,373**	**19,611**	**569**	**20,180**	**77**
W-386 A/B							
F-14 (NAS Oceana Fleet)	0	0	0	100	0	100	
F-14 (NAS Oceana FRS)	14	0	14	36	0	36	
F/A-18 (NAS Oceana Fleet)	0	0	0	150	0	150	

Table 8.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS AND MILITARY OPERATING AREAS
ARS 5

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 5)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	0	0	0	
F/A-18 (NAS Oceana FRS)	0	0	0	65	0	65	
F/A-18 (Marine Corps)	15	0	15	15	0	15	
Other Navy Aircraft	360	199	559	366	199	565	
Air Force Jets	3,308	0	3,308	3,484	0	3,484	
Other Air Force Aircraft	75	24	99	75	24	99	
Coast Guard Aircraft	17	2	19	17	2	19	
NASA (missile launches)	183	0	183	183	0	183	
Contractor	7	4	11	7	4	11	
Civilian	129	27	156	129	27	156	
Total	**4,108**	**256**	**4,364**	**4,627**	**256**	**4,883**	**12**
W-386 D							
F-14 (NAS Oceana Fleet)	275	5	280	325	0	325	
F-14 (NAS Oceana FRS)	684	0	684	684	0	684	
F/A-18 (NAS Oceana Fleet)	0	0	0	139	0	139	
Adversary Aircraft	0	0	0	0	0	0	
Air Force Jets	3	0	3	67	0	67	
NASA (missile launches)	183	0	183	183	0	183	
Total	**1,145**	**5**	**1,150**	**1,398**	**0**	**1,398**	**22**
W-122							
F-14 (NAS Oceana Fleet)	718	44	762	721	40	761	
F-14 (NAS Oceana FRS)	123	0	123	117	0	117	
F/A-18 (NAS Oceana Fleet)	0	0	0	257	4	261	
F/A-18 (MCAS Cherry Point Fleet)	0	0	0	2,715	98	2,813	
Adversary Aircraft	0	0	0	70	0	70	
F/A-18 (Marine Corps)	551	68	619	543	74	617	
AV-8 (Cherry Point Fleet)	2,130	32	2,162	2,069	40	2,109	
AV-8 (MCAS Cherry Point FRS)	1,316	0	1,316	1,276	0	1,276	
EA-6B (MCAS Cherry Point Fleet)	1,606	15	1,621	1,602	23	1,625	

Table 8.2-3

PROJECTED 1999 SORTIES IN WARNING AREAS AND MILITARY OPERATING AREAS ARS 5

User/Service Category	1997 Sorties			Projected 1999 Sorties (ARS 5)			Percent Change (Total)
	Day (0700 - 2200)	Night (2200 - 0700)	Total	Day (0700 - 2200)	Night (2200 - 0700)	Total	
KC-130 (MCAS Cherry Point Fleet)	144	0	144	144	0	144	
KC-130 (MCAS Cherry Point FRS)	231	0	231	226	0	226	
Other Navy Aircraft	452	184	636	454	182	636	
Air Force Jets	4,852	573	5,425	4,873	555	5,428	
Other Air Force Aircraft	270	60	330	270	60	330	
Coast Guard Aircraft	40	4	44	40	4	44	
Contractor	34	9	43	34	9	43	
Civilian	774	63	837	775	62	837	
Total	**13,241**	**1,052**	**14,293**	**16,186**	**1,151**	**17,337**	**21**

Source: ATAC 1997.

Table 8.2-4 PROJECTED 1999 SORTIES IN THE STUMPY POINT MILITARY OPERATING AREA ARS 5					
		Projected 1999 Operations			
User/Service Category	1997 Total	Day (0700-2200)	Night (2200-0700)	Total	Percent Change
F-14 (NAS Oceana Fleet)	56	20	0	20	
F/A-18	0	4	0	4	
Total	**56**	**24**	**0**	**24**	**-57**

Key:

NAS = Naval Air Station.

Source: ATAC 1997.

8.2.3 Target Ranges

Projected sorties and noise levels in BT-9, BT-11, and the Dare County Range are presented in Table 8.2-6. With the exception of BT-9, which would have a noise level increase of 2 dB over the 1995 level, no changes in projected noise levels would occur under ARS 5 above 1997 noise levels.

8.2.3.1 BT-9 (Brant Island Shoal)

Projected operations and utilization rates at BT-9 under ARS 5 would be slightly less than those under ARS 1. Projected operations could be readily accommodated within published operating hours.

Land Use

The impacts of ARS 5 would be similar to those of ARS 1 (see Section 4.3.1). Projected noise levels would be the same for ARSs 1 and 5 (62 dB). BT-9 is located away from any development; therefore, there would be no significant noise impacts.

Table 8.2-5

PROJECTED 1999 RESTRICTED AREA SORTIES AND NOISE LEVELS ARS 5

Restricted Area	Aircraft Type	1997 Sorties	Projected 1999 Sorties - ARS 5			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
			Day (0700-2200)	Night (2200-0700)	Total			
R-5306A (exclusive of BT-9 and BT-11)	A-10	30	30	0	30		50	50
	AH-1	136	136	0	136			
	AV-8 (Fleet)	1,021	1,035	28	1,063			
	AV-8 (FRS)	1,553	1,554	0	1,554			
	EA-6B	288	280	11	291			
	F/A-18 (Marine Corps)	91	95	0	95			
	F-15	56	52	4	56			
	F-16	212	202	8	210			
	F-16 (Air National Guard)	26	26	0	26			
	Other Jet	35	35	0	35			
	Other Prop	90	90	0	90			
	Total	**3,538**	**3,535**	**51**	**3,586**	**1**		
R-5306D	F-18	306	307	0	307		54	54
	AH-1	165	160	5	165			
	UH-1	305	300	5	305			
	CH-46	3,360	3,255	105	3,360			
	CH-53	1,370	1,300	70	1,370			
	AV-8 (Fleet)	562	584	4	588			
	KC-130 (Fleet)	22	22	0	22			
	KC-130 (FRS)	34	34	0	34			
	Total	**6,124**	**5,950**	**189**	**6,139**	**<1**		

Sources: ATAC 1997; Wyle Labs 1997.

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Table 8.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 5

Range	Aircraft Type	1997 Sorties			ARS 5 Sorties			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
BT-9	A-10	110	0	110	146	0	146		60	62
	AH-1	78	0	78	84	0	84			
	AV-8B (Fleet)	246	6	252	260	10	270			
	AV-8B (FRS)	25	0	25	63	0	63			
	EA-6B	13	0	13	13	0	13			
	CH-46	75	0	75	96	0	96			
	CH-53	9	2	11	9	2	11			
	F-14 (NAS Oceana Fleet)	68	0	68	216	12	228			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	52	0	52	84	2	86			
	F-16	380	8	388	410	6	416			
	F/A-18 (NAS Oceana Fleet)	0	0	0	160	4	164			
	F/A-18 (MCAS Cherry Point Fleet)	0	0	0	104	8	112			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	190	10	200	210	8	218			
	H/UH-1	29	0	29	32	0	32			
	Army Helicopters[a]	74	8	82	92	8	100			
	Other Jet[b]	43	0	43	37	0	37			
	Other Prop[c]	20	0	20	20	0	20			
	Total BT-9	1,679	62	1,741	2,307	88	2,391	37		
BT-11	A-10	120	0	120	86	0	86		68	68
	EA-6B	13	0	13	13	0	13			

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Table 8.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS ARS 5

Range	Aircraft Type	1997 Sorties Day (0700-2200)	1997 Sorties Night (2200-0700)	1997 Sorties Total	ARS 5 Sorties Day (0700-2200)	ARS 5 Sorties Night (2200-0700)	ARS 5 Sorties Total	Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
	AH-1	107	0	107	101	0	101			
	AV-8B (Fleet)	1,162	36	1,198	1,092	42	1,134			
	AV-8B (FRS)	720	0	720	679	0	679			
	KC-130 (MCAS Cherry Point Fleet)	18	0	18	18	0	18			
	CH-46	123	0	123	102	0	102			
	CH-53	13	2	15	13	2	15			
	F-14 (NAS Oceana Fleet)	494	2	496	640	18	658			
	F-14 (Other Navy)	30	0	30	30	0	30			
	F-15	400	6	406	376	6	382			
	F-16	388	0	388	392	0	392			
	F-16 (Air National Guard)	198	0	198	152	2	154			
	F/A-18 (NAS Oceana Fleet)	0	0	0	754	18	772			
	F/A-18 (MCAS Cherry Point Fleet)	0	0	0	773	34	807			
	F/A-18 (Other Navy)	237	28	265	237	28	265			
	F/A-18 (Marine Corps)	362	22	384	354	22	376			
	H/UH-1	43	0	43	40	0	40			
	Army Helicopters[a]	80	8	88	70	0	70			
	Other Jet[b]	14	3	17	21	2	23			
	Other Prop[c]	17	0	17	17	0	17			
	Total BT-11	4,539	107	4,646	5,960	174	6,134	32		

Table 8.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 5

Range	Aircraft Type	1997 Sorties			ARS 5 Sorties			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
Dare County Range	A-10	14	0	14	8	4	12		65	65
	AV-8B (Fleet)	68	0	68	46	2	48			
	AV-8B (FRS)	10	0	10	10	2	12			
	EA-6B	5	0	5	5	0	5			
	F-14 (NAS Oceana Fleet)	2,986	38	3,024	2,762	48	2,810			
	F-14 (NAS Oceana FRS)	1,027	0	1,027	1,010	0	1,010			
	F-14 (Other Navy)	9	0	9	9	0	9			
	F-15	156	4	160	146	4	150			
	F-16	346	4	350	318	2	320			
	F-16 (Air National Guard)	498	26	524	548	20	568			
	F/A-18 (NAS Oceana Fleet)	0	0	0	864	94	958			
	F/A-18 (MCAS Cherry Point Fleet)	0	0	0	257	68	325			
	F/A-18 (NAS Oceana FRS)	0	0	0	558	103	661			
	F/A-18 (Adversary)	12	0	12	22	0	22			
	F/A-18 (Other Navy)	53	0	53	53	0	53			
	F/A-18 (Marine Corps)	26	6	32	20	2	22			
	T-34	0	0	0	22	0	22			
	F-15	1,305	102	1,407	1,305	102	1,407			
	F-16	401	4	405	401	4	405			
	A-10	44	0	44	44	0	44			
	AV-8B	81	0	81	81	0	81			
	EA-6B	1	0	1	1	0	1			

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Table 8.2-6

1999 PROJECTED TARGET RANGE ACTIVITY AND NOISE LEVELS
ARS 5

Range	Aircraft Type	1997 Sorties			ARS 5 Sorties			Percent Change	1997 Ldnmr (dB)	1999 Ldnmr (dB)
		Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total			
	F-14	63	0	63	63	0	63			
	F/A-18	1	0	1	1	0	1			
	OA-10	7	0	7	7	0	7			
	Total Dare County Range	7,113	184	7,297	8,561	455	9,016	24		

[a] Modeled as AH-64.
[b] Modeled as F/A-18.
[c] Modeled as KC-130.

Source: ATAC 1997; Wyle Labs 1997.

Water Quality

The impacts of ARS 5 would be similar to or of a lesser magnitude than those of ARS 1 (see Section 4.3.1).

Aquatic Resources

The impacts of ARS 5 would be similar to or of a lesser magnitude than those of ARS 1 (see Section 4.3.1).

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 8.2-7. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 8.2-7. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases would be less than 1 ton per year and would not affect air quality in the area.

8.2.3.2 BT-11 (Piney Island)

Projected aircraft operations and utilization rates at BT-11 under ARS 5 would be similar to those under existing conditions. Projected operations could be accommodated within published operating hours of the range.

Land Use

Land use impacts under ARS 5 would be similar to those under ARS 1 (see Section 4.3.2).

Water Quality

Impacts under ARS 5 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Table 8.2-7

PROJECTED EMISSIONS - BT-9 ARS 5

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	15	0.0011	0.0254	0.0030	0.0007	0.0059
F/A-18	38	0.0101	0.0488	0.0250	0.0011	0.0121
AV-8	316	0.0239	0.1778	0.1722	0.0086	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	146	0.0089	0.0231	0.0721	0.0020	0.0103
F-16	25	0.0003	0.0295	0.0030	0.0004	0.0006
F-15	5	0.0001	0.0061	0.0006	0.0001	0.0001
All Helicopters	323	0.1116	0.2683	1.0667	0.0356	0.0000
Other Jets	19	0.0011	0.0004	0.0085	0.0001	0.0009
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**898**	**0.1597**	**0.5826**	**1.3563**	**0.0488**	**0.0298**
Net Change from 1997	**162**	**0.0272**	**0.1144**	**0.2159**	**0.0081**	**0.0108**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all helicopter operations are below 3,000 ft.

Aquatic Resources

Impacts under ARS 5 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Terrestrial Resources

Impacts under ARS 5 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.2).

Air Quality

Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 8.2-8. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 8.2-8. The net decrease in annual operations below 3,000 feet (914 meters) AGL would result in a net decrease in emissions for all pollutants except NO_x and PM_{10}. NO_x and PM_{10} emissions increase slightly because of an increase in the operations of individual aircraft models, which emit most of the NO_x and PM_{10}.

8.2.3.3 Dare County Range

Projected aircraft operations and utilization rates at the Dare County Range would be slightly less under ARS 5 than under ARS 1. Operations for ARS 5 (7,007) would be slightly less than ARS 1 (7,224). The utilization rate for ARS 5 would be 65% while the utilization rate for ARS 1 would be 67%. These operations could be conducted within published operating hours.

Land Use

Land use impacts under ARS 5 would be similar to those under ARS 1 (see Section 4.3.3).

Water Quality

Impacts under ARS 5 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Table 8.2-8

PROJECTED EMISSIONS - BT-11 ARS 5

Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	41	0.0028	0.0677	0.0081	0.0018	0.0156
F/A-18	111	0.0295	0.1427	0.0732	0.0032	0.0354
AV-8	1,722	0.1363	0.9679	0.9376	0.0468	0.0000
EA-6B	9	0.0025	0.0030	0.0048	0.0002	0.0000
A-10	86	0.0053	0.0136	0.0425	0.0012	0.0061
F-16	24	0.0002	0.0278	0.0025	0.0004	0.0005
F-15	33	0.0003	0.0387	0.0040	0.0006	0.0007
All Helicopters	328	0.1133	0.2724	1.0832	0.0362	0.0000
Other Jets	12	0.0007	0.0003	0.0053	0.0001	0.0005
Other Props	1	0.0001	0.0002	0.0002	0.0000	0.0000
Total	**2,367**	**0.2852**	**1.5343**	**2.1617**	**0.0903**	**0.0589**
Net Change from 1997	**-94**	**-0.0045**	**0.0119**	**-0.1750**	**-0.0058**	**0.0264**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.
Assumed all helicopter operations are below 3,000 ft.
KC-130 operations ignored because aircraft not expected to descend below 3,000 ft. AGL since it is a in-flight refueling aircraft.

Aquatic Resources

Impacts under ARS 5 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Terrestrial Resources

Impacts under ARS 5 would be similar to or of a lesser magnitude than those under ARS 1 (see Section 4.3.3).

Air Quality

A slightly different mix of aircraft models is used at the Dare County Range compared to BT-9 and BT-11. Projected emissions from aircraft operations below 3,000 feet (914 meters) AGL are shown in Table 8.2-9. Emissions were calculated using the same aircraft data used to calculate existing emissions, except for flight operation counts. These data were obtained from NASMOD analyses (ATAC 1997). The net change in emissions from 1997 to 1999 is also shown in Table 8.2-9. The slight emission increase for all pollutants is due to a slight increase in annual operations below 3,000 feet (914 meters) AGL. All emission increases would be less than 1 ton per year and would not affect air quality in the area.

8.2.4 NAS Oceana and NALF Fentress Land Use

The impacts of construction projects at NAS Oceana under ARS 5 would be similar to those discussed for ARS 1 (see Section 4.4). With regard to the station's AICUZ program, the impacts of ARS 5 would be less than those associated with ARS 1.

Figure 8.2-1 presents 1999 projected noise contours and land use. Figure 8.2-2 presents the increase between 1978 AICUZ noise contours and projected 1999 noise contours and land use. With regard to APZs under the AICUZ program, the impacts associated with ARS 5 would be the same as those described for ARS 1, because projected APZs under ARS 5 would be identical to those under ARS 1 (see Section 5.2.4).

8.2.5 Socioeconomics and Community Services

8.2.5.1 Population, Employment, Housing, and Taxes/Revenues

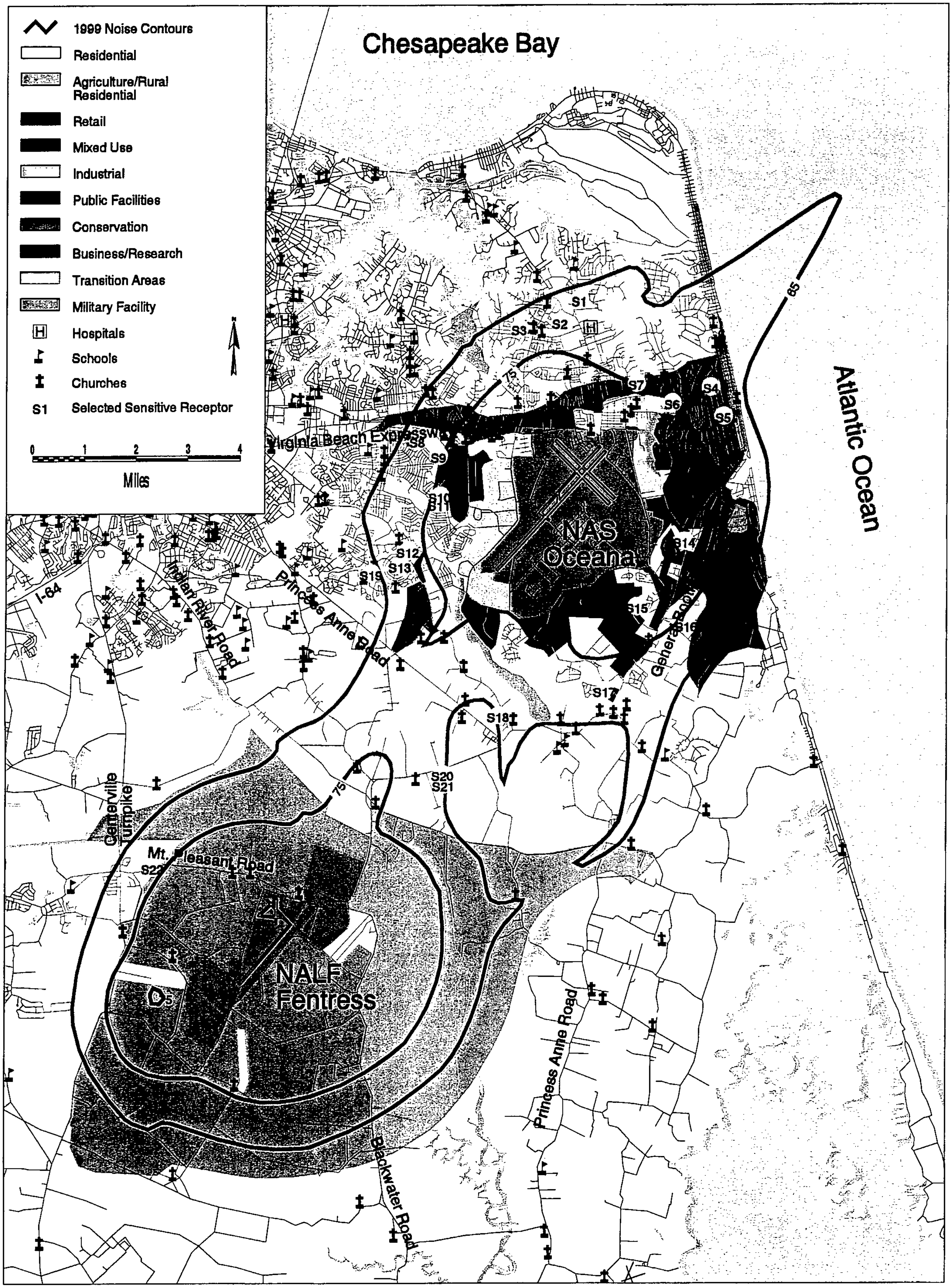
The relocation of six F/A-18 aircraft squadrons and the F/A-18 FRS to NAS Oceana under ARS 5 would result in the transfer of approximately 3,000 personnel (450 officers, 2,450 enlisted personnel, and 100 civilians) to NAS Oceana.

Table 8.2-9

PROJECTED EMISSIONS - DARE COUNTY RANGE ARS 5

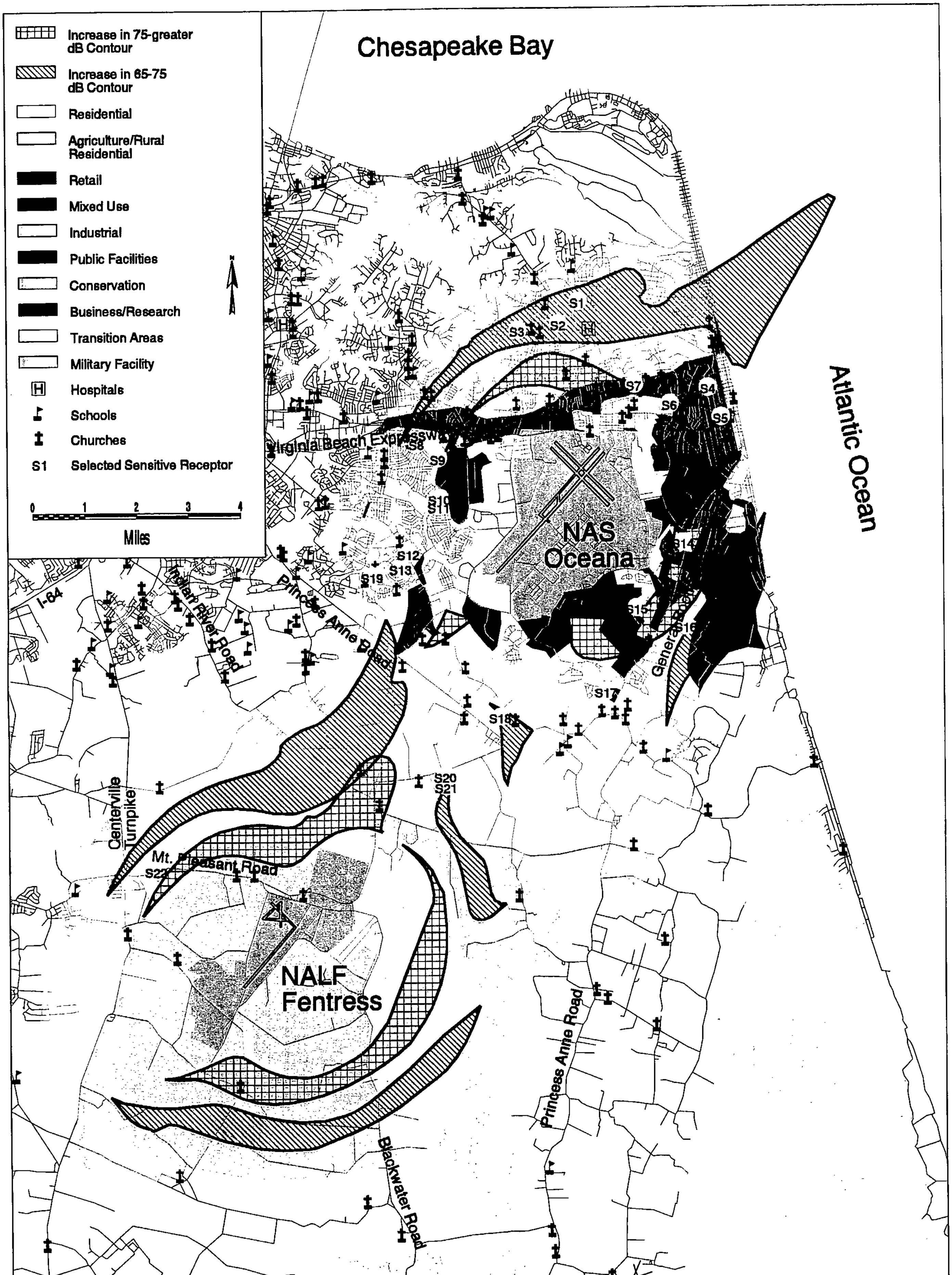
Aircraft Type	Annual Operations Below 3,000 ft.	VOC (tons/yr.)	NO_x (tons/yr.)	CO (tons/yr.)	SO_2 (tons/yr.)	PM_{10} (tons/yr.)
F-14B/D	230	0.0158	0.3770	0.0451	0.0101	0.0869
F/A-18	102	0.0271	0.1312	0.0673	0.0029	0.0325
AV-8	57	0.0043	0.0320	0.0310	0.0015	0.0000
EA-6B	4	0.0010	0.0012	0.0019	0.0001	0.0000
A-10	12	0.0007	0.0019	0.0059	0.0002	0.0009
F-16	53	0.0006	0.0629	0.0065	0.0009	0.0012
F-15	9	0.0001	0.0106	0.0011	0.0002	0.0002
T-34	1	0.0000	0.0000	0.0001	0.0000	0.0000
Total	**468**	**0.0496**	**0.6169**	**0.1588**	**0.0158**	**0.1217**
Net Change from 1997	**66**	**0.0235**	**0.0926**	**0.0371**	**0.0017**	**0.0256**

Notes: Annual operations below 3,000 ft. obtained from COMNAVAIRLANT except as noted below.
Assumed all A-10 operations are below 3,000 ft. based on close air support mission for this aircraft.



Source: Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

Figure 8.2-1
ARS 5 - Projected 1999 Noise Contours and Land Use
NAS Oceana



Source: U.S. Navy 1978; Wyle Labs 1997
City of VA Beach 1991; City of Chesapeake 1993

Figure 8.2-2

ARS 5 - Increase Between 1978 AICUZ Noise Contours and Projected 1999 Noise Contours and Land Use
NAS Oceana

However, as described in ARS 1 and ARS 2, other personnel movements will have occurred or will be occurring at NAS Oceana during the same time period. Table 8.2-10 details the expected changes in personnel loading figures at NAS Oceana between FY 1996 and FY 1999. This alternative and the other planned and ongoing personnel movements would result in a net increase of 4,400 military and civilian personnel at NAS Oceana over the FY 1996 base population of 8,100 personnel.

When demographic characteristics are taken into account, a total of 9,850 new residents would move into the region under ARS 5. Assuming a geographical distribution similar to the existing one, the majority of the relocating residents would live in the City of Virginia Beach; therefore, the City of Virginia Beach would receive the largest population impact in the region (see Table 8.2-11).

Economy, Employment, and Income

Under ARS 5, the impacts on the community economy, employment, and income would be similar to those under ARS 1.

ARS 5 would have a positive economic impact on the region. Income would be injected into the economy via the increase in the military and civilian payroll expenditures (approximately $125 million) and via construction and renovation expenditures (approximately $68.8 million) (see Table 8.2-12).

Housing

The on-station and off-station housing impacts associated with ARS 5 would be the same as those described for ARS 4 (see Section 7.2.5.1).

Taxes and Revenues

The proposed relocation of five F/A-18 aircraft squadrons and the FRS to NAS Oceana would have positive impacts on the fiscal revenues in the south Hampton Roads area. The impacts under ARS 5 would be similar to those described for ARS 4 (see Table 8.2-11).

8.2.5.2 Community Services

The impacts to community services associated with implementation of ARS 5 would be similar to those described for ARS 4. No significant impacts to community services at or around NAS Oceana would occur as a result of ARS 5.

Table 8.2-10

PROJECTED PERSONNEL LOADING AT NAS OCEANA UNDER ARS 5

	FY 1996	FY 1997	FY 1998	FY 1999
Personnel at beginning of FY	8,100	8,800	9,500	12,080
A-6 Decommissioning	-300	-300	NA	NA
A-6 AIMD and ATKWING Support Staff	NA	-100	NA	NA
Realignment of F-14 FRS Detachment[a]	NA	+150	NA	NA
Realignment of F-14 Squadrons[b]	+600	+600	NA	NA
F-14 Support Staff[b]	+400	+50	NA	NA
Transfer of F-14A Aircraft[c]	NA	+300	NA	NA
Realignment of F/A-18 Squadrons[b]	NA	NA	+1,320	+420
F/A-18 Support Staff			+1,260	
End of Fiscal Year	8,800	9,500	12,080	12,500
Net change from beginning of FY 1996	+700	+1,400	+3,980	+4,400

[a] Result of 1993 BRAC recommendations.
[b] Result of 1995 BRAC recommendations.
[c] Result of action separate from BRAC.

Key:

ATKWING = Attack Wing.
AIMD = Aircraft Intermediate Maintenance Department.
FRS = Fleet Replacement Squadron.
FY = Fiscal Year.
NA = Not applicable.

Source: U.S. Navy 1995a.

Table 8.2-11

NET REGIONAL SOCIOECONOMIC IMPACTS AT NAS OCEANA RESULTING FROM ARS 5[a]

	Virginia Beach	Chesapeake	Norfolk	Portsmouth	Suffolk	Total South Hampton Roads	Other	Total Effects
Population Impacts								
Total military personnel relocating	3,270	410	260	110	40	4,090	310	4,400
Number of military dependents	4,040	510	320	140	50	5,060	390	5,450
Total Population Change	**7,310**	**920**	**580**	**250**	**90**	**9,150**	**700**	**9,850**
Personnel and Regional Housing Impacts								
Total officers relocating	450	60	30	20	10	570	40	610
Total enlisted personnel relocating	2,750	340	220	90	30	3,430	260	3,690
Total civilians relocating	70	10	10	0	0	90	10	100
Total Military Households Relocating	**3,270**	**410**	**260**	**110**	**40**	**4,090**	**310**	**4,400**
Fiscal Impacts								
Total population change	7,310	920	580	250	90	9,150	700	9,850
Local per capita tax contribution	$1,005	$1,128	$1,048	$883	$842	NA	NA	NA
Estimated Change in Local Tax Contributions	**$7,346,550**	**$1,037,760**	**$607,840**	**$220,750**	**$75,780**	**$9,288,680**	**NA**	**NA**
Education Impacts								
Total elementary school-age children	1,050	130	80	30	10	1,310	110	1,420
Total middle school-age children	310	40	20	10	10	390	30	420
Total high school-age children	210	30	20	10	0	260	20	280
Total Number of School-Age Children	**1,570**	**200**	**120**	**50**	**20**	**1,960**	**160**	**2,120**

[a] Includes relocations for ARS 5 and other relocations occurring at NAS Oceana.

Table 8.2-12

DIRECT AND INDIRECT ECONOMIC IMPACTS RESULTING FROM THE RELOCATION OF SIX F/A-18 AIRCRAFT SQUADRONS AND THE F/A-18 FLEET REPLACEMENT SQUADRON AT NAS OCEANA UNDER ARS 5

Direct Economic Impacts	
Increase in Military and Civilian Payroll	$125,000,000
Construction Expenditures	$68,826,000
Total	$193,826,000
Indirect Economic Impacts[a]	
Change in Employee Earnings	$20,789,000
Employment Opportunities (jobs)	875

a Indirect economic impacts have only been calculated for construction expenditures.

8.2.6 Infrastructure

8.2.6.1 Water Supply

The impacts of ARS 5 on water supply would be slightly less than those of ARS 1. ARS 5 would result in a net increase of approximately 4,400 personnel at NAS Oceana by the end of 1999. Using the same consumption rates discussed in Section 4.6.1, this would result in a net increase of 0.06 MGD in on-station water consumption by the end of 1999. No significant impacts to on-station water supply would occur as a result of this increase.

With dependents, the net increase of personnel at NAS Oceana would result in an estimated net increase of 9,850 persons in south Hampton Roads. Using daily consumption rates discussed in Section 4.6.1, the daily increase in water consumption in the City of Virginia Beach would be 0.66 MGD by the end of 1999. The daily increase in water consumption in the City of Chesapeake would be 0.06 MGD by the end of 1999.

8.2.6.2 Wastewater System

Impacts to wastewater systems resulting from ARS 5 would be slightly less than those described for ARS 1 (see Section 4.6.2). No significant adverse impacts to wastewater systems would occur under ARS 5.

8.2.6.3 Stormwater

Impacts to stormwater systems at NAS Oceana resulting from ARS 5 would be similar to those described for ARS 1 (see Section 4.6.3).

8.2.6.4 Electrical

Impacts to electrical systems at NAS Oceana resulting from ARS 5 would be similar to those described for ARS 1 (see Section 4.6.4).

8.2.6.5 Heating

Impacts to heating systems at NAS Oceana resulting from ARS 5 would be similar to those described for ARS 1 (see Section 4.6.5).

8.2.6.6 Jet Fuel

Impacts to jet fuel facilities at NAS Oceana resulting from ARS 5 would be similar to those described for ARS 1 (see Section 4.6.6).

8.2.6.7 Solid Waste Management

Impacts to solid waste generation at NAS Oceana resulting from ARS 5 would be slightly less than those described for ARS 1 (see Section 4.6.7). No significant adverse impacts to regional landfill facilities would occur under ARS 5.

8.2.7 Transportation

Impacts on roadways in the vicinity of NAS Oceana would be slightly less than those under ARS 1. Table 8.2-13 and Figure 8.2-3 compare projected traffic on roadways in the vicinity of the station under ARS 5 compared to the projected traffic that would occur without the proposed realignment.

8.2.7.1 Regional Road Network

As under ARS 1, Virginia Beach Boulevard between First Colonial and Princess Anne would degrade in LOS from C to D. A section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F, which would be considered a significant impact. Some roadways in the study area would continue to operate at an unacceptable LOS; however, these are the result of existing traffic and projected growth in the region. Although ARS 5 would result in additional traffic on these thoroughfares, actual impact on transportation

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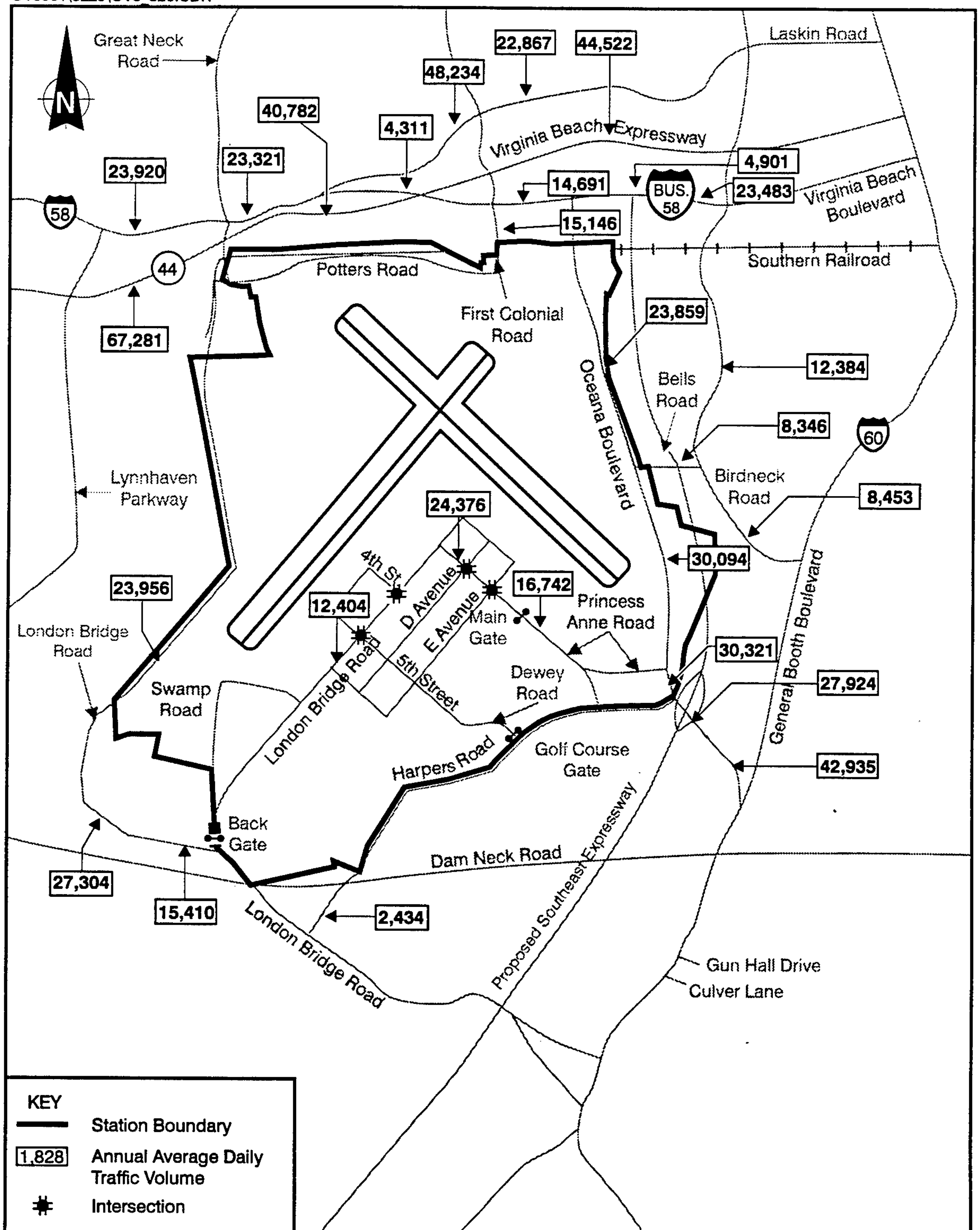


SOURCE: Hampton Roads Planning District Commission 1995c

SCALE

0 1 2 Miles

0 1.6 3.2 Kilometers

Figure 8.2-3 PROJECTED TRAFFIC CONDITIONS ON ROADWAYS SURROUNDING NAS OCEANA FOLLOWING REALIGNMENT UNDER ARS 5

Table 8.2-13

PROJECTED TRAFFIC CONDITIONS UNDER ARS 5 FOLLOWING REALIGNMENT AT NAS OCEANA (Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Princess Anne Road (on base)	21,379	C	24,376	D	2,997
Princess Anne Road (on base)- NASO Main Gate to Oceana Blvd.	13,745	C	16,742	C	2,997
London Bridge Road (on base)	9,591	C	12,404	C	2,813
Harpers Road - Dam Neck to London Bridge	2,295	C	2,434	C	139
Oceana Boulevard - Virginia Beach Blvd. to Bells	23,070	D	23,859	D	789
Oceana Boulevard - Bells to Princess Anne (NASO)	29,017	E	30,094	F	1,077
Oceana Boulevard - Princess Anne (NASO) to Harpers	30,227	F	30,321	F	94
Oceana Boulevard - Harpers to Flicker Way	27,862	D	27,924	D	65
Oceana Boulevard - Flicker Way to General Booth	42,876	F	42,935	F	59
First Colonial Road - Base Boundary to Indiana Avenue	1,737	C	1,741	C	4
First Colonial - Indiana to Virginia Beach Blvd.	14,788	C	15,146	C	358
First Colonial - Virginia Beach Boulevard to Expressway	25,808	D	26,012	D	204
London Bridge Road - Swamp Rd. to Shipps Corner	15,184	F	15,410	F	226
London Bridge Road - Shipps Corner to Crusader Circle	27,284	F	27,304	F	20
London Bridge Road - Crusader Circle to International Parkway	23,949	F	23,956	F	7
Virginia Beach Blvd. - Lynnhaven to Great Neck Road	23,560	B	23,920	B	360

Key at end of table.

Table 8.2-13

PROJECTED TRAFFIC CONDITIONS UNDER ARS 5 FOLLOWING REALIGNMENT AT NAS OCEANA (Daily Traffic Totals)

Road	Projected Traffic Volumes Without Realignment (Trips)	Level of Service (LOS)	Projected Traffic Volumes With Realignment (Trips)	Level of Service (LOS)	Variance (Trips)
Virginia Beach Blvd. - London Bridge Rd. to Chapel Lake	22,961	B	23,321	B	360
Virginia Beach Blvd. - Chapel Lake to Fountain Dr.	3,826	B	4,311	B	485
Virginia Beach Blvd. - Fountain Dr. to First Colonial	4,307	B	5,408	B	1,101
Virginia Beach Blvd. - First Colonial to Oceana	13,306	C	14,691	D	1,385
Virginia Beach Blvd. - Oceana to Shipps Ln.	3,828	B	4,901	B	1,073
Virginia Beach Blvd. - Shipps Ln. to Birdneck	22,970	B	23,483	B	513
Virginia Beach/Norfolk Expressway (SR44) - Lynnhaven to Great Neck	66,882	C	67,281	C	399
Virginia Beach/Norfolk Expressway (SR44) - Great Neck to First Colonial	40,383	B	40,782	B	399
Virginia Beach/Norfolk Expressway (SR44) - First Colonial to Birdneck	44,253	B	44,522	B	299
Laskin Road - Great Neck to Victor Cr.	45,927	F	46,000	F	73
Laskin Road - Victor Cr. to First Colonial	48,234	F	48,234	F	384
Laskin Road - First Colonial to Birdneck Rd.	22,649	B	22,867	B	218
Bells Road - Birdneck to Oceana Blvd.	7,963	C	8,346	C	383
Birdneck Road - General Booth to Bells	8,274	C	8,453	C	179
Birdneck Road - Bells to Owl's Creek	12,205	D	12,384	D	179

Key at end of table.

Table 8.2-13 (Cont.)

Note: LOS based on Generalized Annual Average Daily Volumes for Area's Transitioning into urbanized areas as established in Level of Service Standards and Guidelines Manual for Planning (Florida Department of Transportation 1992).

Key:

A = Free-flow conditions.
B = Stable flow conditions with few interruptions.
C = Stable flow with moderate restrictions on selection of speed, and ability to change lanes and pass.
D = Approaching unstable flow; still tolerable operating speeds, however low maneuverability.
E = Traffic at capacity of segment; unstable flows with little or no maneuverability.
F = Forced flow conditions characterized by periodic stop-and-go conditions and no maneuverability.
NASO = Naval Air Station Oceana.

Sources: HRPDC 2015 Regional Transportation Model 1995c.

would be, in most cases, negligible because the influx of traffic would be small relative to the existing traffic flows. Planned regional road improvements (see Section 3.1.7) and personnel reductions associated with the decommissioning of A-6 squadrons would reduce the impact. Furthermore, planned roadway improvements, specifically the expansion of Oceana Boulevard, would provide additional capacity on the regional transportation network.

8.2.7.2 Station Road Network

As under the other ARSs, the most significant increases in traffic volume under ARS 5 would be on station roadways. Intersections at the station would experience a degradation in LOS similar to that experienced under ARS 1.

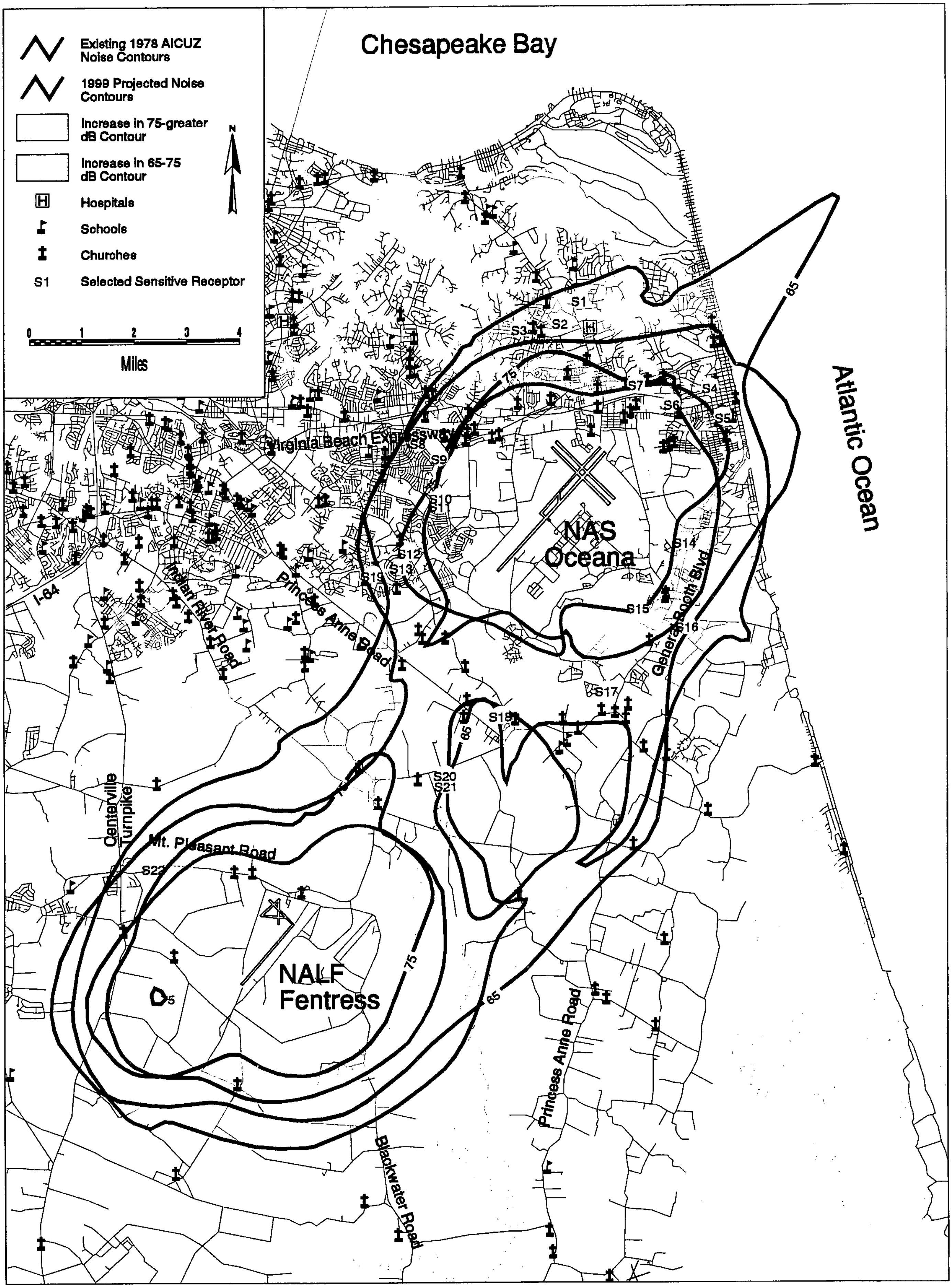
8.2.7.3 Planned Road Improvements

As under ARS 1, traffic projected under ARS 5 would not significantly affect the feasibility of any proposed road improvements in the region.

8.2.8 Noise

Of the five ARSs, ARSs 4 and 5 would result in the lowest levels of noise impacts at and around NAS Oceana and NALF Fentress because five squadrons would be relocated to other bases. Figure 8.2-4 presents projected 1999 AAD noise contours compared to existing 1978 AICUZ noise contours.

Table 8.2-14 compares the estimated area and population within the 1978 AICUZ contours and existing 1997 noise contours to projected 1999 noise contours under ARS 5. The projected 65 to 75 dB noise contour for ARS 5 would cover an area of 31,053 acres (12,567 hectares), with an estimated population of 74,990 people. The 75 dB or greater contour would cover an area of 25,628 acres (10,372 hectares), with an estimated population of 45,098 (Wyle Labs 1997). Areas not previously exposed to an Ldn of 65 to 75 dB would total 9,803 acres (3,967 hectares) and contain an estimated 15,381 people. Areas not previously exposed to an Ldn of 75 dB or greater would total 6,673 (2,701 hectares) and contain an estimated 12,549 people. As in ARSs 1, 2, 3, and 4, selected areas in the vicinity of NAS Oceana would experience a decrease in noise levels due to existing aircraft flight tracks and runway utilization (see Table 8.2-15). Approximately 15,473 people would realize reduced noise levels, including an estimated 11,029 who would experience a decrease in high noise levels (greater than 75 Ldn).



Source: U.S. Navy 1978, Wyle Labs 1997

Figure 8.2-4

ARS 5 - Comparison of 1978 and Projected 1999 Average Annual Day Noise Contours

NAS Oceana

Table 8.2-14

OFF-STATION AREA AND ESTIMATED POPULATION WITHIN 1978 AICUZ, EXISTING 1997, AND PROJECTED 1999 NOISE CONTOURS NAS OCEANA/NALF FENTRESS - ARS 5

Ldn	1978 AICUZ		1997 Noise Contours		1999 Noise Contours		New Area/Population Exposed Relative to 1978 AICUZ[a]	
	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population	Area in Acres (Hectares)	Estimated Population
65 to 75 dB	31,214 (12,632)	66,123	13,293 (5,379)	33,545	31,053 (12,567)	74,990	9,803 (3,967)	15,381
75 dB or greater	20,361 (8,240)	42,445	4,949 (2,002)	1,295	25,628 (10,372)	45,098	6,673 (2,701)	12,549
Total	51,575 (20,872)	108,568	18,242 (7,382)	34,840	56,681 (22,939)	120,088	16,476 (6,668)	27,930

Note: Numbers exclude water areas.

[a] Represents only new area/population that previously were not exposed to listed noise levels under 1978 AICUZ. Does not equal the difference between 1978 AICUZ and 1999 projected area/population estimates, because some areas would no longer be in applicable noise exposure zones in 1999.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Source: Wyle Labs 1997.

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Table 8.2-15

DECREASE IN OFF-STATION AREA/POPULATION NOISE EXPOSURE RELATIVE TO 1978 AICUZ NAS OCEANA/NALF FENTRESS-ARS 5

	Acres (Hectares)	Population
75+ to 65-75 dB	-2,001 (-810)	-11,029
65-75 to <65 dB	-5,034 (-2,037)	-4,444
Total	-7,035 (-2,847)	-15,473

Note: Numbers exclude water areas.

Key:

AICUZ = Air Installations Compatible Use Zones.
dB = Decibel.
Ldn = Day-night average noise level.

Table 8.2-16 presents the projected site-specific Ldn at schools located within the 65 dB or greater Ldn contour. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions (Wyle Labs 1997). Schools are considered compatible with outside noise levels between 65 and 75 Ldn only if they have sufficient sound attenuation to reduce interior noise levels to approximately 45 dB. To analyze potential noise impacts to schools, the school-day (i.e., 7:00 a.m. to 4:00 p.m., when children are normally present) Leq was calculated for 1999 conditions for those schools expected to be within the 65 dB or greater Ldn (see Table 8.2-16). Use of central air conditioning systems in association with closed windows normally reduces noise levels by approximately 25 dB. Therefore, school sites with a 1999 exterior Leq of 70 dB or less would likely experience minimal interference. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at those schools of particular concern.

The maximum sound levels of typical F/A-18 events similar to those conducted at NAS Oceana and NALF Fentress are shown in Table 8.2-17. Levels for F-14s are presented for comparative purposes. The anticipated number of average day operations by event is also presented in Table 8.2-18.

The projected noise contours presented in Figure 8.2-4 are based on current operating procedures and flight patterns at NAS Oceana. The station continually evaluates noise mitigation options to reduce the noise impacts on the local community. These include an evaluation of:

Table 8.2-16

SCHOOLS LOCATED WITHIN 1999 PROJECTED NOISE CONTOURS GREATER THAN 65 Ldn NAS OCEANA/NALF FENTRESS - ARS 5

Identification Number[a]/Name	1997 Ldn (dB)	1999 Ldn (dB)	1999 Leq (dB)
S1 First Colonial High	59	68	66
S2 Lynnhaven Middle	61	71	69
S3 Trantwood Elementary	56	68	66
S4 Virginia Beach Middle	57	69	68
S5 Cooke Elementary	57	69	66
S6 Seatack Elementary[b]	63	76	74
S7 Linkhorn Elementary[b]	62	75	73
S8 Lynnhaven Elementary	55	68	65
S9 Plaza Middle	60	74	70
S10 Brookwood Elementary	66	77	74
S11 Plaza Elementary	67	78	75
S12 Holland Elementary	66	71	69
S13 Green Run Elementary	62	68	66
S14 Birdneck Elementary	67	83	75
S15 Corporate Landing Elementary & Middle	63	78	71
S16 Ocean Lake Elementary	57	73	66
S17 Strawbridge Elementary	58	69	66
S18 Kellam High	56	65	62
S19 Rosemont Elementary	59	64	63
S20 Princess Anne Elementary	52	65	62
S21 Princess Anne Middle	52	65	62
S22 Butts Road Intermediate	52	72	64

[a] Schools are shown on Figure 8.2-4.
[b] Seatack and Linkhorn elementary schools are being relocated.

Key:

dB = Decibel.
Ldn = Day-night average sound level.
Leq = Equivalent sound level.

Source: Wyle Labs 1997.

Table 8.2-17

MAXIMUM SOUND LEVELS AT RECEPTOR WITH AIRCRAFT AT 1,000 FEET AGL (decibels)

	F/A-18	F-14A	F14B/D
Departures	108	97	96
Arrivals	104	83	88
Touch-and-Go	97	87	91
FCLP			
Oceana	97	87	91
Fentress[a]	98	90	93

[a] 800 Feet AGL.

Table 8.2-18

PROJECTED AVERAGE DAY OPERATIONS FOR SELECTED F/A-18 EVENTS

	NAS Oceana	NALF Fentress
Departures	48	8
Arrivals	48	8
Touch- and-Go[a]	78	0
FCLP[a]	2	49

[a] Touch-and-go and FCLP sorties equal two operations each.

- Arrival and departure procedures;
- Airfield hours of operation;
- Pattern altitudes;
- Aircraft power settings;
- Flight tracks; and
- Aircraft maintenance run-up times.

NAS Oceana would continue to evaluate flight procedures in an effort to minimize overall noise impacts on the community. Specific mitigation options would be evaluated if this alternative is selected for implementation. These options are discussed in Section 4.8.

8.2.9 Air Quality

8.2.9.1 Air Quality Regulations

The air quality regulations and conformity issue discussion presented in Section 4.9.1 are also applicable to ARS 5.

8.2.9.2 General Conformity Rule

The General Conformity Rule discussion presented in Section 4.9.2 is also applicable to ARS 5.

8.2.9.3 Projected Emissions at NAS Oceana

Projected emissions for ARS 5 are presented in Table 8.2-19. The categories of sources in ARS 5 are identical to those in ARS 1. Fewer F/A-18 fleet aircraft and siting the FRS at NAS Oceana in 1999 are the only changes affecting emissions. These changes lower the total emissions projected for NAS Oceana in the categories of aircraft, in-frame maintenance run-ups, and engine testing in test cells. Other sources listed in Table 8.2-19 would not be altered by the smaller F/A-18 population associated with ARS 5.

The estimated nonattainment precursor emissions for aircraft flight operations at NAS Oceana in 1999 would be 314 tons per year of VOC and 452 tons per year of NO_X. Attainment pollutant emissions would be 833 tons per year of CO, 20 tons per year of SO_2, and 243 tons per year of PM_{10}. Total nonattainment precursor emissions for other mobile sources would be 54 tons per year of VOC and 231 tons per year of NO_X. Attainment pollutant emissions would be 139 tons per year of CO, 7 tons per year of SO_2, and 84 tons per year of PM_{10}.

The estimated nonattainment ozone precursor emissions for stationary sources in 1999 would be 54 tons per year of VOC and 104 tons per year of NO_x. Attainment pollutant emissions would be 78 tons per year of carbon monoxide, 29 tons per year of SO_2, and 15 tons per year of PM_{10}.

8.2.9.4 Projected Emissions at NALF Fentress

This facility is used in the same manner under ARS 5 as under ARS 1, although fewer F/A-18 aircraft operations occur under ARS 5. The projected emissions for aircraft operations are summarized by year in Table 8.2-19. In 1999, nonattainment precursor emissions (VOC and NO_x) from these operations are estimated to be 11 and 249 tons per

Table 8.2-19
EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 5
FOR 1993 AND 1996-1999
(tons per year)

	1993					1996					1997				
Source Type	VOCs	NOx	CO	SO2	PM10	VOCs	NOx	CO	SO2	PM10	VOCs	NOx	CO	SO2	PM10
NAS Oceana:															
Mobile Sources:															
Aircraft Operations	272.13	328.88	609.85	18.59	152.58	123.33	224.25	295.24	10.78	121.47	150.53	288.46	360.74	13.82	156.23
Total Aircraft	**272.13**	**328.88**	**609.85**	**18.59**	**152.58**	**123.33**	**224.25**	**295.24**	**10.78**	**121.47**	**150.53**	**288.46**	**360.74**	**13.82**	**156.23**
Other Mobile Sources:															
GSE	5.13	26.43	72.65	1.71	2.00	0.00	0.00	0.00	0.00	0.00	4.57	34.01	18.73	2.20	2.66
Maintenance Run-ups	70.29	177.95	130.69	5.82	47.42	29.40	136.41	61.78	3.90	47.42	38.29	198.30	97.19	5.86	72.28
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	**75.97**	**211.27**	**204.82**	**7.98**	**49.90**	**29.96**	**143.30**	**63.26**	**4.35**	**47.90**	**43.42**	**239.20**	**117.40**	**8.51**	**75.42**
Stationary Sources:															
Boilers:	1.13	32.32	8.31	22.09	3.84	0.78	29.13	7.52	23.76	3.63	0.78	29.13	7.52	23.76	3.63
Generators	0.71	8.67	1.87	0.57	0.61	0.71	8.67	1.87	0.57	0.61	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	6.24	37.65	49.40	1.81	4.32	3.94	28.44	39.05	1.31	3.95	5.04	37.00	50.82	1.71	4.63
JP-5 Fuel Handling	0.66	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
Service Station	19.35	0.00	0.00	0.00	0.00	4.46	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00
Painting	19.30	0.00	0.00	0.00	0.00	13.29	0.00	0.00	0.00	0.00	24.05	0.00	0.00	0.00	0.00
Construction:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary	**47.39**	**78.64**	59.58	**24.47**	**8.77**	**23.64**	**66.24**	**48.44**	**25.64**	**8.19**	**37.19**	**94.00**	**65.61**	**29.24**	**10.47**
Total NASO	**395.49**	**618.78**	**874.24**	**51.04**	**211.25**	**176.93**	**433.79**	**406.94**	**40.76**	**177.56**	**231.14**	**621.65**	**543.75**	**51.57**	**242.12**
NALF Fentress:															
Aircraft	13.48	146.63	37.00	6.81	30.87	7.32	154.76	18.20	6.30	42.24	9.21	188.43	22.39	7.45	55.29
Total Annual:	**408.97**	**765.41**	**911.25**	**57.85**	**242.12**	**184.26**	**588.55**	**425.14**	**47.07**	**219.80**	**240.35**	**810.09**	**566.14**	**59.02**	**297.41**

Table 8.2-19
EMISSIONS SUMMARY - NAS OCEANA AND NALF FENTRESS - ARS 5
FOR 1993 AND 1996-1999
(tons per year)

	1998					1999				
Source Type	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**	**VOCs**	**NOx**	**CO**	**SO2**	**PM10**
NAS Oceana:										
Mobile Sources:										
Aircraft Operations	246.79	384.69	639.48	17.49	207.03	314.34	451.96	832.68	20.16	242.97
Total Aircraft	**246.79**	**384.69**	**639.48**	**17.49**	**207.03**	**314.34**	**451.96**	**832.68**	**20.16**	**242.97**
Other Mobile Sources:										
GSE	0.10	1.21	0.26	0.08	0.08	0.00	0.00	0.00	0.00	0.00
Maintenance Run-ups	53.23	223.66	137.81	3.41	83.56	53.23	223.66	137.81	6.58	83.56
Generators	0.56	6.89	1.48	0.45	0.48	0.56	6.89	1.48	0.45	0.48
Total Other Mobile	**53.89**	**231.76**	**139.55**	**3.94**	**84.12**	**53.79**	**230.55**	**139.29**	**7.03**	**84.04**
Stationary Sources:										
Boilers:	0.62	27.13	6.68	22.82	3.38	0.62	27.13	6.68	22.82	3.38
Generators	2.11	27.87	7.27	3.77	2.21	2.11	27.87	7.27	3.77	2.21
Engine Test Cells	9.06	48.58	63.85	1.99	9.17	9.06	48.58	63.85	1.99	9.17
JP-5 Fuel Handling	0.81	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00
Service Station	6.40	0.00	0.00	0.00	0.00	6.72	0.00	0.00	0.00	0.00
Painting	34.12	0.00	0.00	0.00	0.00	34.16	0.00	0.00	0.00	0.00
Construction:	1.96	19.50	6.33	1.85	3.55	0.00	0.00	0.00	0.00	0.00
Total Stationary	**55.08**	**123.07**	**84.13**	**30.43**	**18.31**	**53.57**	**103.58**	**77.80**	**28.58**	**14.76**
Total NASO	**355.76**	**739.52**	**863.16**	**51.86**	**309.46**	**421.70**	**786.08**	**1,049.78**	**55.76**	**341.77**
NALF Fentress:										
Aircraft	10.25	225.87	27.00	8.64	71.22	11.02	248.79	30.00	9.39	81.18
Total Annual:	**366.01**	**965.38**	**890.16**	**60.50**	**380.68**	**432.72**	**1,034.87**	**1,079.78**	**65.15**	**422.95**

Note: Shaded areas indicate nonattainment pollutants of concern.
1993 data and future year estimates based on data current as of June 4 1996.

Key: VOC = volatile organic compounds. SO2 = sulfur dioxide.
NOx = oxides of nitrogen. PM10 = particulate matter. JP-5 = jet fuel.
CO = carbon monoxide. GSE = Ground Support Equipment

year, respectively. Attainment pollutant emissions would total 30 tons per year of carbon monoxide, 9 tons per year of SO_2, and 81 tons per year of PM_{10}.

8.2.9.5 Total Net Projected Emissions

Table 8.2-20 presents the summary of net projected emissions from NAS Oceana and NALF Fentress for 1993 and 1996 through 1999 for ARS 5 The net change in emissions for ARS 5 would be 24 tons per year of VOCs, 269 tons per year of NO_x, 169 tons per year of CO, 7 tons per year of SO_2, and 181 tons per year of PM_{10}. ARS 5 reduces net air emissions by 81 tons per year of VOCs and 127 tons per year of NO_x compared to ARS 1.

8.2.10 Topography, Geology, and Soils

The impacts of ARS 5 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.10).

8.2.11 Water Resources

E & EThe impacts of ARS 5 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.11).

8.2.12 Terrestrial Environment

The impacts of ARS 5 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.12).

8.2.13 Cultural Resources

The impacts of ARS 5 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.13).

8.2.14 Environmental Contamination

The impacts of ARS 5 at NAS Oceana would be the same as those discussed for ARS 1 (see Section 4.14) except hazardous waste generation is estimated to increase to 38,000 lbs. (20,684 kilograms). This represents a 27% increase above 1995 levels. It is expected that this increase can be accommodated by existing station resources.

Table 8.2-20
NET EMISSIONS CHANGE - NAS OCEANA AND NALF FENTRESS - ARS 5
(tons per year)

Year	VOCs	NOx	CO	SO2	PM10
NAS Oceana:					
1993	395.49	618.78	874.24	51.04	211.25
1996	176.93	433.79	406.94	40.76	177.56
1997	231.14	621.65	543.75	51.57	242.12
1998	355.76	739.52	863.16	51.86	309.46
1999	421.70	786.08	1049.78	55.76	341.77
Net Change:					
1993 to 1999	**26.21**	**167.30**	**175.53**	**4.72**	**130.52**
NALF Fentress:					
1993	13.48	146.63	37.00	6.81	30.87
1996	7.32	154.76	18.20	6.30	42.24
1997	9.21	188.43	22.39	7.45	55.29
1998	10.25	225.87	27.00	8.64	71.22
1999	11.02	248.79	30.00	9.39	81.18
Net Change:					
1993 to 1999	**-2.46**	**102.16**	**-7.00**	**2.58**	**50.31**
Net Change NAS Oceana and NALF Fentress:					
1993 to 1999	**23.75**	**269.46**	**168.54**	**7.31**	**180.83**

Note: Shaded areas indicate nonattainment pollutants of concern.

9 Cumulative Impacts

A cumulative impact is the impact on the environment that could result from the incremental impact of the proposed action when added to other past, present, or reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over time.

This section discusses potential cumulative impacts for each of the ARSs as a result of the following:

- Civilian and other military use of and planning for regional airspace around NAS Oceana, MCAS Beaufort, and MCAS Cherry Point;
- Personnel relocations associated with military base closure and realignment actions at installations in the vicinity of NAS Oceana, MCAS Beaufort, and MCAS Cherry Point; and
- General growth trends in the region surrounding NAS Oceana, MCAS Beaufort and MCAS Cherry Point.

9.1 ARS 1

9.1.1 Military Training Areas

All of the cumulative impacts discussed in this section (i.e., 9.1.1) are equally applicable to ARS 1, 2, 3, 4 and 5.

Implementation of ARS 1 would not result in the establishment of any new special use airspace. However, it would result in moderate increases in the use of existing military training areas (i.e., Warning Areas, MTRs, MOAs, and Restricted Areas) in Virginia and eastern North Carolina by Navy F/A-18 aircraft that would be transferred to NAS Oceana. The NASMOD analysis (ATAC 1997) and the noise analysis (Wyle Labs 1997) discussed in Section 4.2 took into account projections of future use of these military training areas by Navy F/A-18 aircraft that would be transferred to NAS Oceana, other users (i.e., Marine Corps, Air Force, Coast Guard, Army), and civilian users. The analysis presented in Section 4.2, therefore, is a cumulative assessment of projected use of existing special use airspace within the region. In all cases, projected utilization would not impair the efficiency or exceed the capacity of any special use airspace in the region (ATAC 1997). According to the noise analysis, the cumulative use of these airspaces by participating aircraft in the region would not significantly increase noise levels (Wyle Labs 1997).

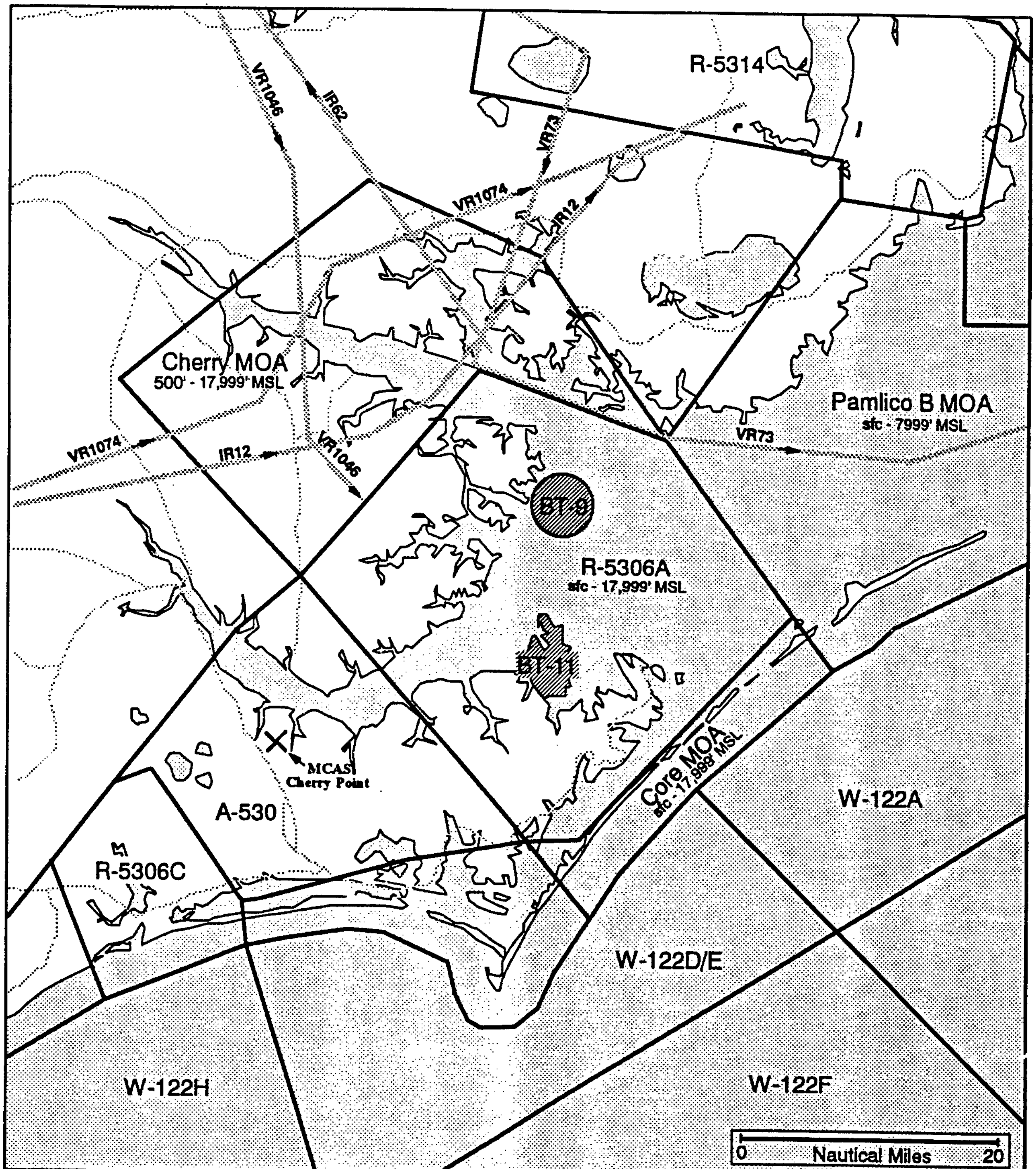
Three pending special use airspace requests in coastal North Carolina were considered in this cumulative impacts assessment. These requests include:

- The creation of the Core and Cherry 1 MOAs near Pamlico Sound in North Carolina;
- The creation of the Phelps MOA; and
- The creation of special use airspace over the Greater Sandy Run Area near Camp Lejeune, North Carolina.

In addition, this section addresses the cumulative impacts of the proposed transfer of F/A-18 aircraft and the special use airspace requests regarding the interaction between military and civilian operations; the proposed introduction of the MV-22 Osprey aircraft to the region; the proposed construction and operation of an East Coast shallow-water training range (SWTR); and F/A-18 aircraft series sitings.

Core and Cherry 1 Military Operating Areas

The Core and Cherry 1 MOAs were first proposed by the U.S. Marine Corps in 1985. NEPA documentation and the Record of Decision for these proposed MOAs were



SOURCE: ATAC 1997.

Figure 9.1-1 PROPOSED CORE AND CHERRY 1 MOAS

completed in 1987. The Core MOA would connect W-122 and R-5306A (see Figure 9.1-1). The MOA would overlie approximately 120 square miles of the Core Banks portion of the Cape Lookout National Seashore and extend 3 miles out over the Atlantic Ocean. The altitude of the proposed MOA ranges from 500 to 17,999 feet. Its establishment would increase the flexibility in training of aircrews and provide for a more realistic training evolution for low-level, high-speed ingress and egress from warning areas to target ranges in R-5306A (i.e., BT-9 and BT-11).

The total number of daily sorties in this MOA would be regulated by an already-established memorandum of agreement between the Marine Corps and the National Park Service. The agreement limits the number of overflights traveling at speeds in excess of 250 knots to 21 sorties (42 crossings) per day.

The Cherry 1 MOA would be an overland area adjacent to the northwest boundary of R-5306A. The Cherry 1 MOA would overlie approximately 750 square miles of private and public land above portions of Beaufort, Craven, Hyde, and Pamlico counties. The altitude of the Cherry 1 MOA also ranges from 500 to 17,999 feet. The establishment of this MOA would increase opportunities for overland training of military aircrews and provide flexibility and training experiences that currently do not exist.

Phelps Military Operating Area

The Phelps MOA, currently proposed for establishment by the U.S. Air Force is designed to be utilized in conjunction with high-altitude air-to-ground missions at R-5314, (i.e., the Dare County Range) providing ingress airspace. The MOA, along with an Air Traffic Control Assigned Airspace (ATCAA) extension, "fills in" the airspace between Hatteras B ATCAA and R-5314, as depicted in Figure 9.1-2. By letter of agreement to be enacted with FAA, the MOA would only be used as part of high-altitude bombing exercises in R-5314. Military aircraft would avoid using the area for training that does not require a high-altitude ingress to the Dare County Range.

Operations in the Phelps MOA would occur at an altitude above 6,000 feet AGL. The Air Force has determined that it qualifies for a categorical exclusion from NEPA, because it is located over existing special use airspace and would result in no significant impacts to built or natural resources.

Greater Sandy Run Area Restricted Airspace

The ongoing realignment of Camp Lejeune, North Carolina, included purchase by the Marine Corps of approximately 41,000 acres known as the Greater Sandy Run Area (GSRA)

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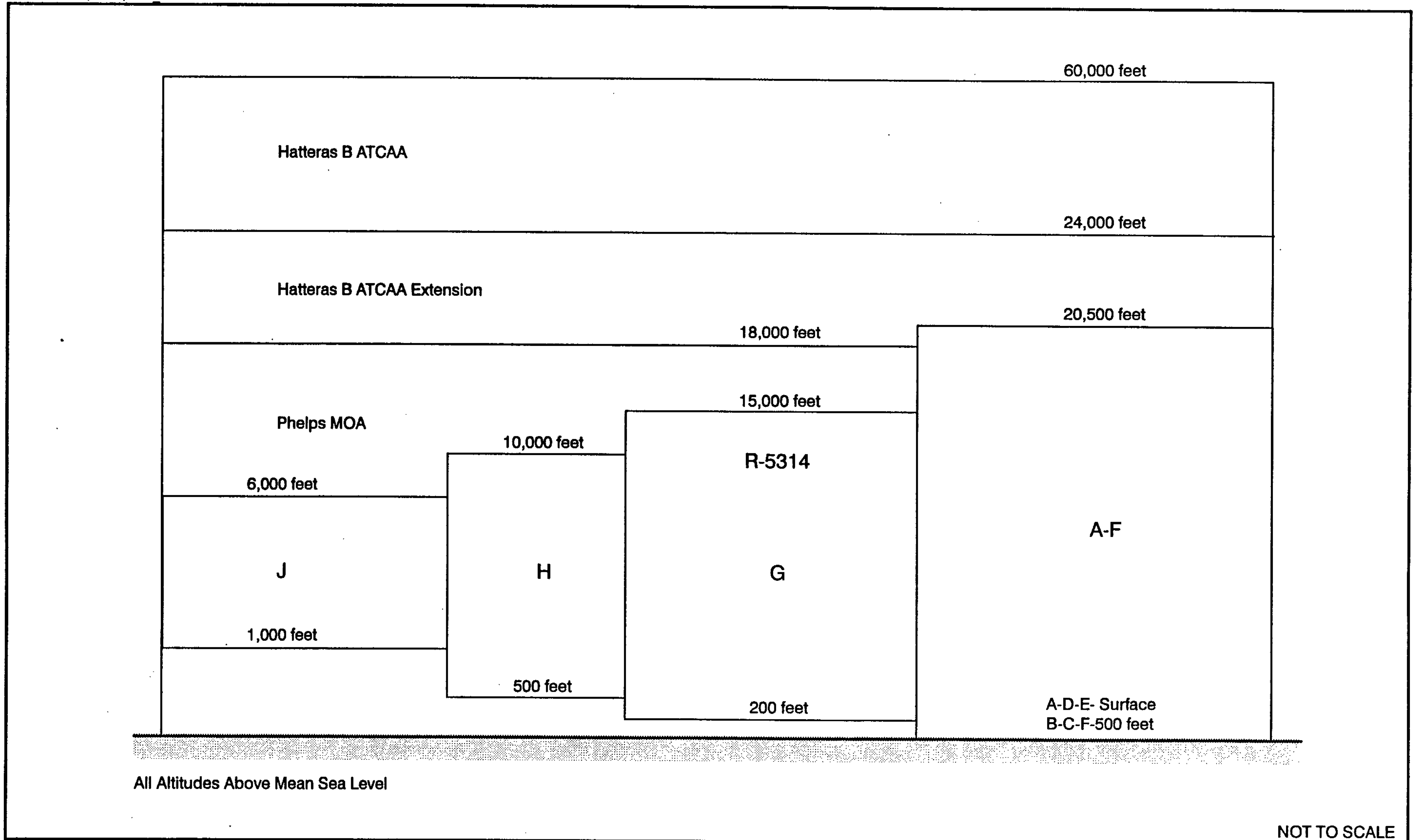


SOURCE: ATAC 1997

Figure 9.1-2 SCHEMATIC CROSS-SECTION OF THE PROPOSED PHELPS MOA

to be used as part of training maneuvers. A 50-square-mile restricted area would be established over the GSRA providing for three vertically stratified areas of restricted airspace with positive real-time control and utilization to accommodate joint/intermittent use by nonparticipating commercial and general aviation aircraft. The proposed restricted area extends from the surface to 17,999 feet above MSL, to support direct, indirect fire and helicopter operations.

The proposed action for transfer of F/A-18 aircraft to NAS Oceana does not include the use of the GSRA Restricted Area, nor would it displace operations that occur in other special use airspace that would need to be absorbed by the GSRA airspace.

Interaction between Military and Civilian Aircraft Operations

Although various components of special use airspace in eastern North Carolina have sufficient capacity to support ARS 1 and other DoD aircraft activities, logistics of operations by civilian aircraft may become more complicated as a result of increased DoD operations and the establishment of the proposed special use airspace (Core and Cherry 1 MOAs, Phelps MOA, and the GSRA restricted airspace). The proposed action, when considered in combination with the four special use airspace proposals, may result in a negative cumulative impact on civilian aircraft use in eastern North Carolina. The relationship of DoD and civilian aircraft represents a negative cumulative impact. Steps are currently being taken by the Navy to more effectively manage special use airspace to allow for better real time use of the airspace.

Currently, the controlling agency for the majority of all airspace in the region is the FAA's Washington Air Route Traffic Control Center. FACSFAC VACAPES is the scheduling authority for all over-water warning areas. MCAS Cherry Point Air Traffic Control (ATC) has approach control responsibility inland up to and including 18,000 feet AGL, and coordinates use of the following special use airspace: A-530, R-5306A (including BT-9 and BT-11), R-5306C, R-5306D/E, and the Hatteras F MOA (special use airspace shown in Section 3, Figure 3.1-3).

The Navy is in the process of determining an appropriate site for an air surveillance radar system in eastern North Carolina (ATAC 1997). This project is also separate from the proposed action. The Elizabeth City Coast Guard Station is the proposed site for this system. The system would provide possible data feeds to FACSFAC VACAPES, MCAS Cherry Point, FAA's Washington Air Route Traffic Control Center, and Norfolk Approach Control. This radar coverage would offer significant benefits to all civilian and military users of airspace in the region, including:

- Increased flight safety by allowing air controllers to provide more efficient control of instrument and visual flight operations;

- Increased service to at least five civilian airfields in the region, which will be able to receive VFR and IFR services below 5,000 feet, including radar separation; and

- Improved traffic flow for civilian aircraft to the Dare County Airport and military traffic associated with operations in R-5314.

Implementation of this measure could mitigate any adverse impacts to the interaction between military and civilian aircraft operations from the transfer of F/A-18 aircraft to NAS Oceana and the proposed special use airspace.

Introduction of MV-22 Osprey to MCAS New River

A new aircraft is proposed for introduction in eastern North Carolina. The MV-22 Osprey is a new aircraft concept, utilizing the helicopter's vertical capabilities and the level flight performance of fixed-wing turbo aircraft. It is proposed for introduction at MCAS New River in 2000. The Osprey FRS would be operational in 2002, and the first fleet squadron would be operational in 2003. The proposed introduction of the MV-22 Osprey will be evaluated in compliance with NEPA beginning in late 1997. However, potential impacts will be mitigated in part by retirement of the CH-46 helicopter inventory.

East Coast Shallow-Water Training Range

The Navy is proposing to construct and operate an East Coast shallow-water training range (SWTR) off the east coast. The preferred site is in Onslow Bay, North Carolina. The project includes installation of bottom-mounted transducers, which would collect information to monitor and evaluate the performance of Naval units operating in the SWTR. It would be used in conjunction with other offshore air-, land- and water-based training activities. The transducers would be connected to the shore by cable and may be trenched-in using standard telephone cabling technology. An NOI to prepare an EIS on the proposed action was published in the Federal Register on May 13, 1996. Operation of the SWTR is not anticipated to result in cumulative impacts associated with transfer of F/A-18 aircraft from NAS Cecil Field.

F/A-18 Aircraft Series Sitings

Realignment of F/A-18 aircraft to NAS Oceana under ARS 1 could be cumulatively impacted by future aircraft siting decisions. The F/A-18 aircraft proposed for relocation to NAS Oceana are series C/D. The Navy is proposing to purchase a new E/F series of F/A-18 aircraft. The E/F series would initially be placed on the West Coast, and an EIS is currently being prepared to address the environmental impacts of that proposed action. Although it is too early to project possible dates, if the F/A-18s from NAS Cecil Field are relocated to NAS Oceana, it is reasonably foreseeable that NAS Oceana would become the proposed placement site for F/A-18 E/F aircraft replacing the F-14 and F/A-18 C/D aircraft. If the Navy makes such a proposal in the future, the appropriate NEPA analysis would be conducted at that time. Potential impacts associated with replacement of C/D aircraft with new E/F aircraft would be primarily to air quality and the noise environment (refer to sections 9.1.6 and 9.1.7).

9.1.2 Target Ranges

All of the cumulative impacts discussed in this section (i.e., 9.1.1) are equally applicable to ARS 1, 2, 3, 4 and 5.

Implementation of ARS 1 would result in moderate increases in the use of target ranges in eastern North Carolina (BT-9, BT-11, and the Dare County Range) by Navy F/A-18 aircraft that would be transferred to NAS Oceana. However, as with military training areas, the NASMOD analysis (ATAC 1997) and the noise analysis (Wyle Labs 1997) discussed in Section 4.3 took into account projections of future military target range use by other DoD users. Therefore, the analysis presented in Section 4.3 is a cumulative assessment of projected use of military target range airspace. In all cases, projected utilization would not impair the efficiency or exceed the capacity of any of these target ranges (ATAC 1997). In addition, the cumulative use of these ranges by participating aircraft in the region would not significantly increase noise levels (Wyle Labs 1997).

9.1.3 Socioeconomics and Community Services

Realignment of F/A-18 aircraft and associated functions from NAS Cecil Field is part of an overall plan by the DoD to reduce and realign the country's military forces, as detailed in the mandates associated with implementation of the 1991, 1993, and 1995 BRAC Commission recommendations.

Realignment of F/A-18 aircraft and functions to NAS Oceana under ARS 1 would result in the transfer of 4,200 personnel to the area. Along with other planned moves and

decommissionings at the station related to the A-6 and F-14 missions, this would result in a net increase of 5,600 personnel at the station by 1999. As discussed in Section 4.5, this increase would impact the population, economy, and community services of south Hampton Roads and the City of Virginia Beach. These impacts would have a cumulative impact when considering the number of personnel relocations that have occurred through the 1991, 1993, and 1995 BRAC actions at military installations in the south Hampton Roads area.

As shown on Table 9.1-1, the sum total of all gains and losses from BRAC actions between 1988 and 1995 (excluding NAS Oceana) is a loss of more than 17,000 military and civilian positions in the Commonwealth of Virginia and a net gain of approximately 1,800 positions in the south Hampton Roads area. The cumulative impact of realignment of F/A-18 aircraft and associated functions and personnel to the Commonwealth of Virginia would only minimally mitigate previous personnel losses that have occurred. The cumulative impact of a 5,600-position gain in addition to the gain of 1,800 under other BRAC actions in the south Hampton Roads area is a net change of only 3% in the existing population of military and military-employed civilians in the area, which exceeds 125,000. Fluctuations in military population have and will continue to occur in the management of the military population in the south Hampton Roads area. Therefore, cumulative impacts to the economy and community services as a result of the total personnel relocations under other BRAC actions would not be significant.

9.1.4 Infrastructure

South Hampton Roads has adequate infrastructure capacity to meet the requirements of ARS 1. However, future availability of water supply could be affected by the timing of the completion of a major public works project in the region.

Currently, in response to water supply shortages, the City of Virginia Beach has instituted a moratorium on the extension of water lines to undeveloped areas within its jurisdiction and is already operating under water flow restrictions.

The Lake Gaston project involved the construction of a pipeline to transport water to the region from the Virginia Power Company's Lake Gaston and Roanoke River hydroelectric power project reservoir in North Carolina (see Section 3.1.6.1). Scheduled receivers of this water are the Isle of Wight County and the cities of Virginia Beach and Chesapeake. The project is scheduled for completion in 1998.

In the short-term, the realignment activities would not result in adverse cumulative impacts. The existing housing supply would accommodate relocating personnel. In the

Table 9.1-1

U.S. DEPARTMENT OF DEFENSE
BASE CLOSURE AND REALIGNMENT IMPACTS IN VIRGINIA

Year/Installation	Action	Out		In		Net Gain/(Loss)	
		Military	Civilian	Military	Civilian	Military	Civilian
1988							
Cameron Station	Close	337	4,355	0	0		
Defense Mapping Agency, Herndon	Close	0	12	0	0		
Fort Belvoir	Receive	293	1,390	578	4,711		
Fort Lee	Receive	0	0	198	48		
Subtotal		630	5,757	776	4,759	146	(998)
1991							
Harry Diamond	Close	0	90	0	0		
Labs, Woodbridge NMWEA Yorktown	Close	12	204	0	0		
Army Research Institute, Alexandria	Realign	3	54	0	0		
Fort Belvoir	Realign	17	147	0	0		
NSCSES Norfolk[a]	Realign	1	280	0	0		
Naval Hospital Portsmouth[a]	Receive	0	0	119	40		
Naval Station Norfolk[a]	Receive	0	0	698	20		
FCDSSA Dam Neck	Receive	0	0	10	374		
DTRC Detachment Norfolk	Receive	0	0	0	60		
Naval Shipyard Norfolk[a]	Receive	0	0	5	257		
NSWC Dahlgren	Receive	0	0	1	1,002		
Subtotal		33	775	833	1,753	800	978
1993							
Vint Hill Farms Station	Close	407	1,472	0	0		
Naval Aviation Depot Norfolk[a]	Close	104	4,295	0	0		
7th Communications Group Pentagon (DISA)	Disestablish	108	41	0	0		
NCTAMS Norfolk (DISA)[a]	Disestablish	0	122	0	0		
NSC Norfolk (DISA)[a]	Disestablish	0	125	0	0		
IPC Richmond (DISA)	Disestablish	0	261	0	0		
NAVMAC	Disestablish	96	108	0	0		
NAVSEACYSENGST (NUWC)	Disestablish	4	1,407	0	.0		

Key at end of table.

Table 9.1-1

U.S. DEPARTMENT OF DEFENSE
BASE CLOSURE AND REALIGNMENT IMPACTS IN VIRGINIA

Year/Installation	Action	Out		In		Net Gain/(Loss)	
		Military	Civilian	Military	Civilian	Military	Civilian
Bureau of Personnel (Navy)	Relocate	1,070	924	0	0		
Naval Air Systems Command	Relocate	543	3,128	0	0		
Naval Sea Systems Command	Relocate	360	3,439	0	0		
Naval Supply Systems Command	Relocate	89	291	0	0		
Naval Facilities Engineering Command	Relocate	36	485	0	0		
Nav Sec Grp Act (NAVMASSO)	Relocate	221	431	0	0		
Fort Belvoir	Realign	4	455	28	28		
Naval Weapons Station Yorktown	Realign	7	205	0	0		
NESEC Portsmouth[a]	Realign	5	1,410	0	0		
Fleet Combat Training Center, Atlantic	Receive	22	73	970	199		
Naval Air Station Norfolk	Receive	0	0	49	423		
Naval Amphibious Base Little Creek	Receive	0	0	262	4		
Naval Hospital Portsmouth[a]	Receive	0	0	603	59		
Naval Station Norfolk[a]	Receive	0	14	4,364	90		
Naval Surface Warfare Center	Receive	0	0	5	175		
Norfolk Naval Shipyard[a]	Receive	0	16	228	1,139		
SUPSHIP Portsmouth[a]	Receive	0	0	5	340		
Subtotal		3,076	18,792	6,514	2,457	3,438	(16,335)
1995							
Fort Pickett	Close	9	245	0	0		
Naval Mgt. Systems SPT Office Chesapeake[a]	Disestablish	6	15	0	0		
Fort Lee (Kenner Hospital)	Realign	99	106	0	0		
CG MCCDC Quantico	Receive	0	0	12	0		
Defense General Supply Center	Receive	0	0	12	347		
Fort Belvoir	Receive	0	0	11	41		
NSWC Dahlgren	Receive	0	0	0	24		
Norfolk Naval Shipyard[a]	Receive	0	0	0	230		

Key at end of table.

Table 9.1-1

U.S. DEPARTMENT OF DEFENSE
BASE CLOSURE AND REALIGNMENT IMPACTS IN VIRGINIA

Year/Installation	Action	Out		In		Net Gain/(Loss)	
		Military	Civilian	Military	Civilian	Military	Civilian
SPAWAR Arlington	Redirect	201	932	0	0		
Information Systems Software Command	Relocate	141	191	0	0		
Subtotal		456	1,489	35	642	(421)	(847)
TOTAL		4,195	26,813	8,158	9,611	3,963	(17,202)

Note: These figures represent planning estimates and do not necessarily reflect actual personnel relocations.

[a] Facilities/installations in the Hampton Roads area.

Key:

CG MCCDC	=	Marine Corps Combat Development Command.
DISA	=	Defense Information Systems Agency.
IPC	=	Information Processing Center.
NAVMASSO	=	Naval Management Systems Support Office.
NAVSEACYSENGST	=	Naval Sea Combat Systems Engineering Station.
NCTAMS	=	Naval Computer and Telecommunications Area Master Station.
NESEC	=	Naval Electronics Systems Engineering Center.
NMWEA	=	Naval Mine Warfare Engineering Activity.
NSC	=	Naval Supply Center.
NSWC	=	Naval Surface Warfare Center.
NUWC	=	Naval Undersea Warfare Center.
SPAWAR	=	Space and Naval Warfare Systems Command.
SUPSHIP	=	Supervisor of Shipbuilding, Conversion, and Repair.

Source: Miglinico 1997.

long-term, the potential exists for cumulative impacts on the regional water supply, depending on the completion schedule of projects to ensure future water supply for the south Hampton Roads area.

9.1.5 Transportation

The basis of the traffic assessment for ARS 1 presented in Section 4.7 was derived from the regional transportation model developed by the Hampton Roads Planning District Commission (HRPDC). This model projects future regional traffic volumes by integrating anticipated socioeconomic and development growth trends and the associated transportation implications. The Commission first forecasted regional growth in households and employment from a base year (1990). The Hampton Roads region was then divided into transportation analysis zones, and the socioeconomic data were correlated to these zones. An inventory of the number, characteristics, traffic loads, and planned improvements along various road segments in each zone was also conducted. Future traffic associated with projected regional growth was then distributed among various road segments using data on home- and work-based vehicle trips. Finally, projected road segment levels of service (LOSs) were calculated, assuming completion of various planned improvements (HRPDC 1995b).

In effect, the HRPDC regional transportation model is a cumulative assessment of projected traffic growth in the region without the realignment activities that would occur under ARS 1. The traffic assessment for this DEIS involved projecting and distributing traffic that would be generated under ARS 1 to various road segments using HRPDC's methodology and recalculating road segment LOSs. Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 1. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from LOS E to F, which would be considered a significant impact. Several planned traffic improvement projects, including the expansion of Oceana Boulevard, would reduce traffic congestion.

9.1.6 Air Quality

Implementation of ARS 1 would result in a net increase of ozone nonattainment precursor compound emissions (VOC and NO_x) from activities at NAS Oceana/NALF Fentress into the Hampton Roads air basin between 1993 and 1999. In addition, numerous other non-NAS Oceana/NALF Fentress point, area, and mobile sources in the Hampton Roads air basin would show either a net increase or net decrease in emissions of VOC and NO_x between 1993 and 1999. The cumulative impact of these net emission changes is a net change in amount of ozone formed in the air basin.

VDEQ is required to monitor and regulate the cumulative impact of all VOC and NO_x emissions, including those from NAS Oceana and NALF Fentress, to ensure NAAQS for ozone is not exceeded. VDEQ controls the cumulative impact using an ozone maintenance plan. The plan contains emission budgets for calendar years 1993 (the attainment year), 2000, and 2008. These emission budgets contain a positive net emission change allotment for VOC and NO_x emissions from NAS Oceana/NALF Fentress. Other Hampton Roads basin-wide emission sources, primarily automobile gasoline refueling, consumer and commercial solvent use, and various paint coating activities, are allotted a negative net emission change. The cumulative net change from all sources, including NAS Oceana/NALF Fentress, is a decrease in VOC and NO_x emissions in the Hampton Roads air basin.

For NAS Oceana/NALF Fentress, net emission changes are less than the allotted values and indicate no cumulative impact on ozone concentrations in the air basin. The estimated net change of VOC and NO_x emissions between 1993 and 1999 is 102 tons per year VOC and 508 tons per year NO_x, which are below the 200 tons per year of VOC and 800 tons per year of NO_x allotted in the emissions budgets for NAS Oceana/NALF Fentress between 1993 and 1999.

If a future proposal is made to replace F/A-18 C/D aircraft with new E/F aircraft, a change in air emissions would result, particularly for NO_x. Exact emission estimates for basing E/F aircraft in a particular location would depend on site-specific data for each location, including exact scenarios of operating mode and TIM. Therefore, the impacts associated with any future proposal cannot be accurately determined. Notwithstanding, in general, the new E/F aircraft will emit approximately 55% more NO_x than C/D aircraft operating in the same mode, and it is anticipated that the E/Fs will produce approximately 28% fewer NO_x emissions than an F-14 operating in the same mode.

There would be no cumulative impact on existing and projected air basin-wide emissions of attainment air pollutants (CO, SO_2, and PM_{10}). The Hampton Roads air basin is in attainment for these pollutants, and ambient monitoring data indicate that concentrations of these pollutants in the air basin are significantly below NAAQS. Therefore, the additional emissions generated under ARS 1 are not expected to exceed NAAQSs.

9.1.7 Noise

Realignment of F/A-18 aircraft to NAS Oceana under ARS 1 would have no cumulative impacts with existing aircraft noise on-station or off-station. Impacts of the recent decommissioning of A-6 aircraft at the station and the transfer of F-14 aircraft from NAS Miramar to NAS Oceana were incorporated into the direct and indirect noise impact analysis for this DEIS. The nearest source of potential cumulative impacts off-station would be the Norfolk International Airport, with 75 Ldn contours surrounding the runways. However, the Norfolk International Airport is located 10 miles to the northeast, and the respective noise contours for the Norfolk International Airport and NAS Oceana do not overlap.

If a future proposal in made to replace F/A-18 C/D or F-14 aircraft with new F/A-18 E/F aircraft, changes in noise contours would occur. Noise measurements taken on a prototype E/F indicate that the E/F is slightly quieter (1 to 2 dB) than the C/D in flight because of the larger wing area, greater lift, and reduced power requirements. However, the E/F is significantly noisier than the F-14 aircraft. The overall noise environment in the vicinity of NAS Oceana/NALF Fentress would depend on the required mix of fleet aircraft at the time of the proposal.

9.2 ARS 2

9.2.1 Military Training Areas

Cumulative impacts associated with military training areas near NAS Oceana would be similar to ARS 1 (see Section 9.1.1); however, fewer Navy aircraft would be conducting operations in these airspaces in eastern North Carolina.

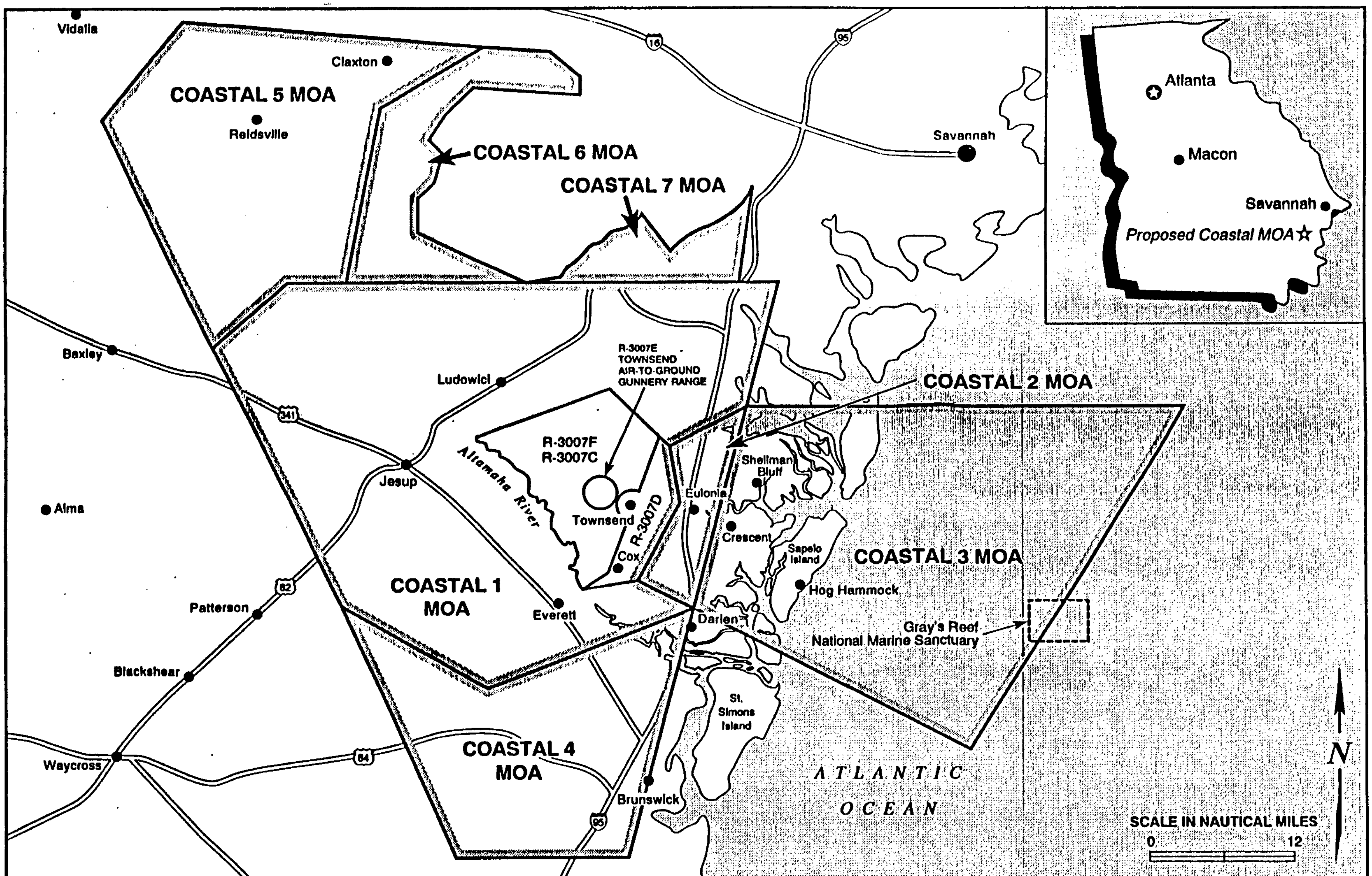
Regarding military training areas in the region around MCAS Beaufort, one major action is currently being implemented that would result in very minor cumulative impacts when added to the realignment activities under ARS 2. The Georgia Air National Guard is currently in the process of modifying military training airspace in southeastern Georgia (Georgia Air National Guard 1995). NEPA documentation and the Record of Decision on this action was completed in mid-1996. The changes involve replacement of the currently charted airspace components (discussed in Section 3.2.2) with a new airspace structure. These airspace components would collectively be referred to as the Coastal MOA (see Figure 9.2-1). The modified airspace was designed to provide military aircraft (i.e., Air Force, Air National Guard, Marine Corps, Navy) with a more efficient airspace structure to satisfy training requirements. Additionally, the changes would represent a simplification of the current airspace boundaries. Projections of the use of this MOA would total over 4,000 sorties annually (Georgia Air National Guard 1995).

The addition of the operations of two Navy F/A-18 squadrons associated with ARS 2 would add relatively few additional sorties in this airspace (i.e., 460 sorties annually). However, these additional sorties would be somewhat offset by the loss of NAS Cecil Field F/A-18 operations that were included in the projections used for the establishment of the airspace. The F/A-18 operations would be added to current projections for the use of the airspace. The addition of two squadrons would not affect the viability of the airspace reconfiguration or require redesign of the current plan. The addition of two squadrons would not present significant cumulative impacts on the use or availability of MTRs.

9.2.2 Target Ranges

Cumulative impacts associated with target ranges near NAS Oceana would be similar to ARS 1 (see Section 9.1.2); however, fewer Navy aircraft would be conducting operations in these ranges.

There would be no cumulative impacts related to the use of the main target range near MCAS Beaufort (i.e., the Townsend Bombing Range); there are no reasonably foreseeable proposed actions that would have a cumulatively significant affect on the use of this range.



SOURCE: Georgia Air National Guard 1995.

Figure 9.2-1 PROPOSED COASTAL MOAS

9.2.3 Socioeconomics and Community Services

Realignment of F/A-18 aircraft and functions to NAS Oceana and MCAS Beaufort includes the transfer of 500 military positions to MCAS Beaufort and 3,700 positions to NAS Oceana. As discussed in Section 5, these transfers would impact the population, economy, and community services of the respective local communities.

Cumulative impacts on the Hampton Roads area based on the number of personnel relocations that have occurred through the 1991, 1993, and 1995 BRAC actions at military installations in the Hampton Roads area are discussed above for ARS 1. As under ARS 1, cumulative impacts would be insignificant under ARS 2 because 500 fewer positions would be transferred to NAS Oceana than under ARS 1.

Cumulative impacts to the Beaufort County population would be minimal because of other BRAC actions that have occurred in South Carolina. As shown on Table 9.2-1, the state of South Carolina has incurred a net loss of slightly more than 4,000 military and civilian positions. Most of these losses occurred in Charleston and Myrtle Beach; however, Beaufort County gained slightly more than 600 additional military positions.

The cumulative impact is not considered significant, considering the size of the local population and the period of time over which personnel relocations have and will occur. Cumulative impacts to the economy and community services as a result of the total personnel relocations under BRAC actions would not be significant.

9.2.4 Infrastructure

Cumulative impacts associated with water supply issues around NAS Oceana would be slightly less that those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area.

There would be no cumulative impacts related to infrastructure issues around MCAS Beaufort; no reasonably foreseeable future actions will occur that would cumulatively affect public infrastructure systems.

9.2.5 Transportation

Traffic is projected to increase by approximately 5% in the vicinity of MCAS Beaufort without the realignment activities under ARS 2 (SCDOT 1996). After adding traffic associated with ARS 2, no changes to projected LOSs would occur on roads in the vicinity of the station.

Table 9.2-1

U.S. DEPARTMENT OF DEFENSE
BASE CLOSURE AND REALIGNMENT IMPACTS IN SOUTH CAROLINA

Year/Installation	Action	Out		In		Net Gain/(Loss)	
		Military	Civilian	Military	Civilian	Military	Civilian
1988							
Fort Jackson	Receive	0	0	661	126		
Subtotal		0	0	661	126	661	126
1991							
Myrtle Beach AFB	Close	3,193	799	0	15		
Fort Jackson	Receive	0	0	2,993	589		
Shaw AFB	Receive	0	0	722	27		
Charleston AFB	Receive	0	0	253	37		
Subtotal		3,193	799	3,968	668	775	(131)
1993							
Naval Station Charleston	Close	8,634	1,194	0	0		
Charleston Naval Shipyard	Close	74	4,837	0	0		
Naval Supply Center Charleston	Realign	9	39	0	0		
Defense Depot Charleston	Disestablish	5	202	0	0		
NSC Charleston (DISA)	Disestablish	0	77	0	0		
Fort Jackson	Receive	0	0	293	52		
Shaw AFB	Receive	0	0	258	5		
MCAS Beaufort[a]	Receive	0	0	111	0		
Naval Hospital Beaufort[a]	Receive	0	0	465	83		
NESEC Charleston	Receive	0	0	74	4,377		
Charleston AFB	Redirect	253	37	0	0		
Subtotal		8,975	6,386	1,201	4,517	(7,774)	(1,869)
1995							
FISC Charleston	Close	2	6	0	0		
Naval Readiness Command 7 Charleston	Close	30	16	0	0		
Fort Jackson	Receive	0	0	1,403	88		

Key at end of table.

Table 9.2-1

U.S. DEPARTMENT OF DEFENSE
BASE CLOSURE AND REALIGNMENT IMPACTS IN SOUTH CAROLINA

Year/Installation	Action	Out		In		Net Gain/(Loss)	
		Military	Civilian	Military	Civilian	Military	Civilian
Navy Weapons Station Charleston	Receive	0	0	2,747	13		
Shaw AFB (726 ACS. Homestead AFB)	Redirect	123	3	0	0		
Subtotal		155	25	4,150	101	3,995	76
TOTAL		12,323	7,210	9,980	5,412	(2,343)	(1,798)

Note: These figures represent planning estimates and do not necessarily reflect actual personnel relocations.

[a] Facilities/installations in Beaufort County.

Key:

AFB = Air Force Base.
DISA = Defense Information Systems Agency.
FISC = Fleet and Industrial Supply Center.
MCAS = Marine Corps Air Station.
NESEC = Naval Electronics Systems Engineering Center.
NSC = Naval Supply Center.

Source: Miglinico 1997.

Cumulative impacts associated with traffic around NAS Oceana would be slightly less than those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area (see Section 5.2.7). Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 2. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from LOS E to F, which would be considered a significant impact. Several planned traffic improvement projects, including the expansion of Oceana Boulevard, would reduce traffic congestion.

9.2.6 Air Quality

No cumulative air quality impacts would occur for ambient air quality concentrations in the vicinity of MCAS Beaufort because there are few additional sources of criteria air pollutants near MCAS Beaufort. The small net emissions increase in ARS 2 would not be expected to impact existing air quality levels.

Net emissions of all pollutants from NAS Oceana/NALF Fentress under ARS 2 are less than under ARS 1. As discussed under ARS 1, no cumulative impacts on ozone levels are anticipated for emissions of VOCs and NO_x. Other criteria air pollutant emissions from NAS Oceana/NALF Fentress would also have no cumulative impacts.

If a future proposal is made to replace F/A-18 C/D aircraft with new E/F aircraft, a change in air emissions would result, particularly for NO_x. Exact emission estimates for basing E/F aircraft in a particular location would depend on site-specific data for each location, including exact scenarios of operating mode and TIM. Therefore, the impacts associated with any future proposal cannot be accurately determined. Notwithstanding, in general, the new E/F aircraft will emit approximately 55% more NO_x than C/D aircraft operating in the same mode, and it is anticipated that the E/Fs will produce approximately 28% fewer NO_x emissions than an F-14 operating in the same mode.

9.2.7 Noise

As discussed under ARS 1, no cumulative noise impacts are anticipated at NAS Oceana. No cumulative noise impacts are anticipated for the population projected within the MCAS Beaufort noise contours from any of the regional air facilities including Hilton Head Airport, Beaufort County Airport, Ridgeland Airport, and Laurel Hill Airport.

If a future proposal in made to replace F/A-18 C/D or F-14 aircraft with new F/A-18 E/F aircraft, changes in noise contours would occur. Noise measurements taken on a prototype E/F indicate that the E/F is slightly quieter (1 to 2 dB) than the C/D in flight because of the larger wing area, greater lift, and reduced power requirements. However, the

E/F is significantly noisier than the F-14 aircraft. The overall noise environment in the vicinity of NAS Oceana/NALF Fentress would depend on the required mix of fleet aircraft at the time of the proposal.

9.3 ARS 3

9.3.1 Military Training Areas

Cumulative impacts associated with military training areas would be similar to those associated with ARS 1 because aircraft under ARS 3 would be stationed at MCAS Cherry Point and NAS Oceana and conduct aircraft operations in the same military training areas in eastern North Carolina (see Section 9.1.1).

9.3.2 Target Ranges

Cumulative impacts associated with military training areas would be similar to those associated with ARS 1 because aircraft would be stationed at MCAS Cherry Point and NAS Oceana and would conduct most of their training at three target ranges in eastern North Carolina (BT-9, BT-11, and the Dare County Range). Cumulative levels of operations and noise levels (along with other DoD users of the ranges) would be similar to ARS 1 (see Section 9.1.2).

9.3.3 Socioeconomics and Community Services

Realignment of F/A-18 aircraft and functions to NAS Oceana and MCAS Cherry Point includes the transfer of 800 military positions to MCAS Cherry Point and 3,500 positions to NAS Oceana. As discussed in Section 6, these transfers would impact the population, economy, and community services of the respective local communities.

Cumulative impacts on the Hampton Roads area based on the number of personnel relocations that have occurred through the 1991, 1993, and 1995 BRAC actions at military installations in the Hampton Roads area are discussed above for ARS 1; however, under ARS 3, 800 fewer positions would be transferred to NAS Oceana compared to ARS 1.

Based on previous BRAC actions, cumulative impacts will not be significant. As shown on Table 9.3-1, the state of North Carolina has incurred a net gain of approximately 3,400 military and civilian positions; these gains are primarily at MCAS Cherry Point and MCAS New River, located approximately 50 miles south of MCAS Cherry Point. Impacts of the relocation of additional personnel to the Naval Aviation Depot at MCAS Cherry Point are discussed in Section 4.3.5; these impacts are not considered significant. Approximately 900 positions will be relocated to MCAS New River, but will overlap only partially on the local communities of Craven and Carteret counties. Therefore, cumulative impacts to the population, economy, and community services of these areas are not considered significant.

Table 9.3-1

**U.S. DEPARTMENT OF DEFENSE
BASE CLOSURE AND REALIGNMENT IMPACTS IN NORTH CAROLINA**

Year/Installation	Action	Out		In		Net Gain/(Loss)	
		Military	Civilian	Military	Civilian	Military	Civilian
1991							
Pope AFB	Receive	0	0	575	22		
Subtotal		0	0	575	22	575	22
1993							
MCAS Cherry Point (DISA)[a]	Disestablish	1	57	0	0		
RASC Camp Lejeune (DISA)[a]	Disestablish	27	11	0	0		
MCAS New River[a]	Receive	0	0	207	0		
Naval Aviation Depot Cherry Point	Receive	0	0	314	1,692		
Subtotal		28	68	521	1,692	493	1,624
1995							
MCAS New River[a]	Receive	0	0	703	0		
Subtotal		0	0	703	0	703	0
TOTAL		28	68	1,799	1,714	1,771	1,646

Note: These figures represent planning estimates and do not necessarily reflect actual personnel relocations.

[a] Facilities/installations in four-county area surrounding MCAS Cherry Point.

Key:

AFB = Air Force Base.
DISA = Defense Information Systems Agency.
MCAS = Marine Corps Air Station.

Source: Miglinico 1997.

9.3.4 Infrastructure

Cumulative impacts associated with water supply issues around NAS Oceana would be slightly less than those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area under ARS 3.

There would be no cumulative impacts related to infrastructure issues around MCAS Cherry Point; no reasonably foreseeable future actions will occur that would cumulatively affect public infrastructure systems.

9.3.5 Transportation

Traffic is projected to increase by approximately 3.5% in the vicinity of MCAS Cherry Point without the realignment activities under ARS 3. After adding traffic associated with ARS 3, no changes to projected LOSs would occur on roads in the vicinity of the station.

Cumulative impacts associated with traffic around NAS Oceana would be slightly less than those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area (see Section 6.2.7). Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 3. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from LOS E to F, which would be considered a significant impact. Several planned traffic improvement projects, including the expansion of Oceana Boulevard, would reduce traffic congestion.

9.3.6 Air Quality

No cumulative air quality impacts would occur for ambient air quality concentrations in the vicinity of MCAS Cherry Point because there are few additional sources of criteria air pollutants near MCAS Cherry Point. The small net emissions increase in ARS 3 would not be expected to impact existing air quality levels.

Net emissions of all pollutants from NAS Oceana/NALF Fentress under ARS 3 are less than under ARS 1. As discussed under ARS 1, no cumulative impacts on ozone levels are anticipated for emissions of VOCs and NO_X. Other criteria air pollutant emissions from NAS Oceana/NALF Fentress would be expected to have no cumulative impacts.

If a future proposal is made to replace F/A-18 C/D aircraft with new E/F aircraft, a change in air emissions would result, particularly for NO_X. Exact emission estimates for basing E/F aircraft in a particular location would depend on site-specific data for each location, including exact scenarios of operating mode and TIM. Therefore, the impacts

associated with any future proposal cannot be accurately determined. Notwithstanding, in general, the new E/F aircraft will emit approximately 55% more NO_x than C/D aircraft operating in the same mode, and it is anticipated that the E/Fs will produce approximately 28% fewer NO_x emissions than an F-14 operating in the same mode.

9.3.7 Noise

As discussed under ARS 1, no cumulative noise impacts are anticipated at NAS Oceana. Because no regional airport or military airfield is located within the vicinity of MCAS Cherry Point, no cumulative noise impacts are anticipated for the population that would be impacted by the F/A-18 aircraft noise impacts projected for MCAS Cherry Point.

If a future proposal in made to replace F/A-18 C/D or F-14 aircraft with new F/A-18 E/F aircraft, changes in noise contours would occur. Noise measurements taken on a prototype E/F indicate that the E/F is slightly quieter (1 to 2 dB) than the C/D in flight because of the larger wing area, greater lift, and reduced power requirements. However, the E/F is significantly noisier than the F-14 aircraft. The overall noise environment in the vicinity of NAS Oceana/NALF Fentress would depend on the required mix of fleet aircraft at the time of the proposal.

9.4 ARS 4

9.4.1 Military Training Areas

Cumulative impacts associated with military training areas near NAS Oceana would be similar to ARS 1; however, fewer Navy aircraft would be conducting operations in these airspaces in eastern North Carolina (see Section 9.1.1).

The addition of the 1,200 operations associated with 5 squadrons under ARS 4 would increase the number of additional sorties in the proposed Coastal MOA compared to ARS 2. The additional sorties would be somewhat offset by the loss of NAS Cecil Field F/A-18 operations that were included in the projections used for the establishment of the airspace. This would not affect the viability of the airspace reconfiguration or require any additional measures to redesign the current plan.

9.4.2 Target Ranges

Cumulative impacts associated with target ranges near NAS Oceana would be similar to ARS 1, 2, 3, or 5; however, fewer Navy aircraft would be conducting operations in these ranges (see Section 9.1.2).

There would be no cumulative impacts related to the use of the main target range near MCAS Beaufort (i.e., the Townsend Bombing Range); no reasonably foreseeable actions will occur that would have a cumulatively significant affect on the use of this range.

9.4.3 Socioeconomics and Community Services

Realignment of F/A-18 aircraft and functions to NAS Oceana and MCAS Beaufort includes the transfer of 1,300 military and civilian positions to MCAS Beaufort and 3,000 positions to NAS Oceana. As discussed in Section 7, these transfers would impact the population, economy, and community services of the respective local communities.

Cumulative impacts on the Hampton Roads area based on the number of personnel relocations that have occurred through the 1991, 1993, and 1995 BRAC actions at military installations in the Hampton Roads area are discussed above for ARS 1. As under ARS 1, cumulative impacts would be insignificant under ARS 4 because 1,200 fewer positions would be transferred to NAS Oceana than under ARS 1.

Cumulative impacts to the Beaufort County population would be minimal because of other BRAC actions that have occurred in South Carolina through the 1991, 1993, and 1995 BRAC actions at military installations as discussed above for ARS 2. Although slightly higher, cumulative impacts would be insignificant under ARS 4.

9.4.4 Infrastructure

Cumulative impacts associated with water supply issues around NAS Oceana would be slightly less that those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area.

There would be no cumulative impacts related to infrastructure issues around MCAS Beaufort; no reasonably foreseeable actions will occur that would cumulatively affect public infrastructure systems.

9.4.5 Transportation

Traffic in the region around MCAS Beaufort is projected to increase under ARS 4 compared to ARS 2. Even after consideration of projected regional traffic growth, no changes to projected LOSs would occur on roads in the vicinity of the station (see Section 7.1.7).

Cumulative impacts associated with traffic around NAS Oceana would be slightly less than those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area (see Section 7.2.7). Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 4. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from LOS E to F, which would be considered a significant impact. Several planned traffic improvement projects, including the expansion of Oceana Boulevard, would reduce traffic congestion.

9.4.6 Air Quality

No cumulative air quality impacts would occur for ambient air quality concentrations in the vicinity of MCAS Beaufort because there are few additional sources of criteria air pollutants near MCAS Beaufort. The net emissions increase in ARS 4 would not be expected to impact existing air quality levels.

Net emissions of all pollutants from NAS Oceana/NALF Fentress under ARS 4 are less than under ARS 1. As discussed under ARS 1, no cumulative impacts on ozone levels are anticipated for emissions of VOCs and NO_x. Other criteria air pollutant emissions from NAS Oceana/NALF Fentress would also have no cumulative impacts.

If a future proposal is made to replace F/A-18 C/D aircraft with new E/F aircraft, a change in air emissions would result, particularly for NO_x. Exact emission estimates for basing E/F aircraft in a particular location would depend on site-specific data for each location, including exact scenarios of operating mode and TIM. Therefore, the impacts

associated with any future proposal cannot be accurately determined. Notwithstanding, in general, the new E/F aircraft will emit approximately 55% more NO_X than C/D aircraft operating in the same mode, and it is anticipated that the E/Fs will produce approximately 28% fewer NO_X emissions than an F-14 operating in the same mode.

9.4.7 Noise

As discussed for ARS 1 and ARS 2, no cumulative noise impacts are anticipated at NAS Oceana or MCAS Beaufort.

If a future proposal in made to replace F/A-18 C/D or F-14 aircraft with new F/A-18 E/F aircraft, changes in noise contours would occur. Noise measurements taken on a prototype E/F indicate that the E/F is slightly quieter (1 to 2 dB) than the C/D in flight because of the larger wing area, greater lift, and reduced power requirements. However, the E/F is significantly noisier than the F-14 aircraft. The overall noise environment in the vicinity of NAS Oceana/NALF Fentress would depend on the required mix of fleet aircraft at the time of the proposal.

9.5 ARS 5

9.5.1 Military Training Areas

Cumulative impacts associated with military training areas would be similar to those associated with ARS 1 because aircraft under ARS 5 would be stationed at MCAS Cherry Point and NAS Oceana and conduct aircraft operations in the same military training areas in eastern North Carolina (see Section 9.1.1).

9.5.2 Target Ranges

Cumulative impacts associated with military training areas would be similar to those associated with ARS 1 because aircraft would be stationed at MCAS Cherry Point and NAS Oceana and would conduct training at three target ranges in eastern North Carolina (BT-9, BT-11, and the Dare County Range). Cumulative levels of operations and noise levels (along with other DoD users of the ranges) would be similar to ARS 1 (see Section 9.1.2).

9.5.3 Socioeconomics and Community Services

Realignment of F/A-18 aircraft and functions to NAS Oceana and MCAS Cherry Point includes the transfer of 1,300 military positions to MCAS Cherry Point and 3,000 positions to NAS Oceana. As discussed in Section 8, these transfers would impact the population, economy, and community services of the respective local communities.

Cumulative impacts on the Hampton Roads area based on the number of personnel relocations that have occurred through the 1991, 1993, and 1995 BRAC actions at military installations in the Hampton Roads area are discussed above for ARS 1; however, under ARS 5, 1,200 fewer positions would be transferred to NAS Oceana compared to ARS 1.

Based on previous BRAC actions, cumulative impacts will not be significant. The state of North Carolina has incurred a net gain of approximately 3,400 military and civilian positions; these gains are primarily at MCAS Cherry Point and MCAS New River, located approximately 50 miles south of MCAS Cherry Point. Impacts of the relocation of additional personnel to the Naval Aviation Depot at MCAS Cherry Point are discussed in Section 4.3.5; these impacts are not considered significant. Approximately 900 positions will be relocated to MCAS New River, but will overlap only partially on the local communities of Craven and Carteret counties. Therefore, cumulative impacts to the population, economy, and community services of these areas are not considered significant.

9.5.4 Infrastructure

Cumulative impacts associated with water supply issues around NAS Oceana would be slightly less than those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area under ARS 5.

There would be no cumulative impacts related to infrastructure issues around MCAS Cherry Point; no reasonably foreseeable future actions will occur that would cumulatively affect public infrastructure systems.

9.5.5 Transportation

Traffic in the region around MCAS Cherry Point is projected to increase under ARS 5 compared to ARS 3. NC 101 between Crocker/Roosevelt Road and Cunningham Boulevard would degrade from LOS B to E, and US 70 between Jackson Road and NC 101 would degrade from LOS C to E. These would be considered significant impacts. The Navy will work with NCDOT to increase the LOS and reduce traffic impacts on this road.

Cumulative impacts associated with traffic around NAS Oceana would be less than those associated with ARS 1 because fewer persons would be relocating to the south Hampton Roads area (see Section 8.2.7). Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 5. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from LOS E to F, which would be considered a significant impact. Several planned traffic improvement projects, including the expansion of Oceana Boulevard, would reduce traffic congestion.

9.5.6 Air Quality

No cumulative air quality impacts would occur for ambient air quality concentrations in the vicinity of MCAS Cherry Point because there are few additional sources of criteria air pollutants near MCAS Cherry Point. The small net emissions increase in ARS 5 would not be expected to impact existing air quality levels.

Net emissions of all pollutants from NAS Oceana/NALF Fentress under ARS 5 are less than under ARS 1. As discussed under ARS 1, no cumulative impacts on ozone levels are anticipated for emissions of VOCs and NO_X. Other criteria air pollutant emissions from NAS Oceana/NALF Fentress would be expected to have no cumulative impacts.

If a future proposal is made to replace F/A-18 C/D aircraft with new E/F aircraft, a change in air emissions would result, particularly for NO_X. Exact emission estimates for basing E/F aircraft in a particular location would depend on site-specific data for each

location, including exact scenarios of operating mode and TIM. Therefore, the impacts associated with any future proposal cannot be accurately determined. Notwithstanding, in general, the new E/F aircraft will emit approximately 55% more NO_x than C/D aircraft operating in the same mode, and it is anticipated that the E/Fs will produce approximately 28% fewer NO_x emissions than an F-14 operating in the same mode.

9.5.7 Noise

As discussed under ARS 1, no cumulative noise impacts are anticipated at NAS Oceana. Because no regional airport or military airfield is located within the vicinity of MCAS Cherry Point, no cumulative noise impacts are anticipated for the population that would be impacted by the F/A-18 aircraft noise impacts projected for MCAS Cherry Point.

If a future proposal in made to replace F/A-18 C/D or F-14 aircraft with new F/A-18 E/F aircraft, changes in noise contours would occur. Noise measurements taken on a prototype E/F indicate that the E/F is slightly quieter (1 to 2 dB) than the C/D in flight because of the larger wing area, greater lift, and reduced power requirements. However, the E/F is significantly noisier than the F-14 aircraft. The overall noise environment in the vicinity of NAS Oceana/NALF Fentress would depend on the required mix of fleet aircraft at the time of the proposal.

10 Consistency with Federal Policies Addressing Environmental Justice in Minority Populations and Low-Income Populations

Consistent with Executive Order 12898 of February 11, 1994, it is the Navy's policy to identify and address disproportionately high and adverse human health or environmental effects of actions on minority and low-income populations. This policy states that the Navy shall:

- Ensure that all programs or activities under its control receiving federal financial assistance and that affect human health or the environment do not directly or indirectly use criteria, methods, or practices that discriminate on the basis of race, color, or national origin;

- Analyze the human health, economic, and social effects of Department of the Navy actions, including effects on minority and low-income communities, when such analysis is required under NEPA;

- Ensure that, whenever feasible, mitigation measures outlined or analyzed in NEPA documentation address significant and adverse environmental effects of proposed federal actions on minority and low-income communities;

- Ensure that opportunities for community input in the NEPA process are provided, including identifying potential effects and mitigation measures in consultation with affected communities, and improve the accessibility of meetings, crucial documents, and notices; and

- Ensure that the public, including minority communities and low-income communities, has adequate access to public information relating to human health or environmental planning, regulation, and enforcement.

Criteria, methods, and practices used in the preparation of this DEIS to evaluate the significance of impacts resulting from the proposed realignment of aircraft squadrons from

NAS Cecil Field were based on scientific and technical methodologies and do not discriminate either directly or indirectly on the basis of income, race, color, or national origin. All methods of data collection, analyses, and evaluation used are widely accepted and are unbiased scientific and technical practices.

The majority of the adverse impacts expected to result from implementation of one of the ARSs identified in this document would be associated with aircraft noise. Tables 10-1 through 10-6 list census tracts that fall within the largest noise exposure contours projected to occur in 1999, when one of the five ARSs will have been chosen and implemented. The net result of these actions would include increased populations around NAS Oceana, MCAS Cherry Point, and/or MCAS Beaufort, depending on the realignment scenario adopted for implementation. These populations would be subjected to higher Ldn levels following realignment compared with existing AICUZ noise levels.

Tables 10-1 and 10-2 provide demographic and economic data for all census tracts that would be affected by the projected change in noise levels for NAS Oceana. Figure 10-1 shows the locations of census tracts in the vicinity of NAS Oceana and NALF Fentress. Table 10-1 shows the racial composition of each Virginia Beach census tract, and Table 10-2 shows the percentage of low-income households in each tract as defined by the U.S. Department of Housing and Urban Development (HUD). HUD defines any household that has 80% or less of an area's median household income as being a low or a very low income household. As presented in Table 10-1 minority groups account for approximately 19.8% of the total population in the area impacted by the increase noise contours. This figure is very similar to the citywide levels of 19.5% and 29.3% for Virginia Beach and Chesapeake, respectively. Likewise, as shown on Table 10-2, the proportion of households considered low-income in the affected area are comparable to the overall figures of 22.6% in the City of Virginia Beach and 25.5% in the City of Chesapeake. Therefore, the proposed realignment of F/A-18 aircraft squadrons would not disproportionately affect minority or low-income neighborhoods surrounding NAS Oceana.

Similar to the analysis of NAS Oceana, Tables 10-3 and 10-4 provide demographic and economic data for all census tracts that would be affected by the projected change in noise levels around MCAS Beaufort (see Figure 10-2). Table 10-3 shows the racial composition of each census tract, and Table 10-4 shows the percentage of low-income households in each census tract. Approximately 44.0% of the total population in the affected area are from minority groups. Similarly, 35.2% of the affected households are considered low-income. These figures are compared to the totals for Beaufort County as a whole of 30.4% and 28.2%, respectively. Although the affected area has a larger proportion of persons from

Table 10-1

TOTAL PERSONS BY RACE AND HISPANIC ORIGIN FOR ALL CENSUS TRACTS AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT NAS OCEANA[a]

Census Tract	Race						Total Persons	Percent Minority
	White	Black	Asian	Indian	Other	Hispanic Orgin		
208.04	2,410	265	65	6	0	38	2,784	13.4
210.03	7,888	438	71	18	0	93	8,508	7.3
211.01	3,901	149	27	4	1	62	4,144	5.9
211.02	3,554	1,014	19	11	0	39	4,637	23.4
422.00	7,928	288	130	24	5	159	8,534	7.1
426.00	2,234	198	50	15	1	46	2,544	12.2
428.00	7,397	2,150	312	30	6	365	10,260	27.9
432.00	631	432	28	7	2	84	1,184	46.7
436.00	1,631	6	16	3	0	19	1,675	2.6
438.00	3,628	43	16	3	0	38	3,728	2.7
440.01	3,968	471	37	24	4	151	4,655	14.8
440.02	6,658	477	53	27	6	160	7,381	9.8
442.01	3,859	2,254	48	16	1	144	6,322	39.0
444.01	3,697	79	59	12	1	48	3,896	5.1
444.02	5,012	347	131	6	3	126	5,625	10.9
446.00	5,452	104	21	11	0	55	5,643	3.4
448.04	8,119	1,174	155	36	3	409	9,896	18.0
448.05	2,650	557	70	16	3	165	3,461	23.4
448.06	3,728	1,257	51	26	10	154	5,226	28.7
452.00	3,855	926	61	30	3	291	5,166	25.4
454.04	6,427	1,678	352	35	6	370	8,868	27.5
454.05	3,796	843	285	11	10	152	5,097	25.5
454.06	3,568	806	191	28	4	193	4,790	25.5
454.07	2,660	638	156	6	2	95	3,557	25.2
454.08	4,977	766	162	31	3	272	6,211	19.9
454.09	7,051	816	426	18	9	272	8,592	17.9
454.10	1,939	518	34	18	1	35	2,545	23.8
454.11	12,064	1,282	330	54	10	520	14,260	15.4

Table 10-1

TOTAL PERSONS BY RACE AND HISPANIC ORIGIN FOR ALL CENSUS TRACTS AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT NAS OCEANA[a]

Census Tract	Race						Total Persons	Percent Minority
	White	Black	Asian	Indian	Other	Hispanic Orgin		
454.13	0	0	0	0	0	0	0	0.0
458.01	3,530	483	261	15	2	175	4,466	21.0
458.02	6,003	1,109	265	24	13	211	7,625	21.3
458.04	6,525	2,095	709	32	13	377	9,751	33.1
460.07	9,351	2,142	850	62	35	617	13,057	28.4
460.08	6,308	1,200	803	29	6	404	8,750	27.9
464.00	2,932	213	9	15	1	4	3,174	7.6
466.00	761	198	7	0	0	0	966	21.2
Total Affected Area	166,092	27,416	6,260	703	164	6,343	206,978	19.8
Virginia Beach[b]	316,290	54,800	1,612	16,947	3,420		393,069	19.5
Chesapeake[b]	107,395	41,643	529	1,815	594		151,976	29.3

[a] Does not include NAS Oceana census tract.

[b] Persons of Hispanic origin were assigned to racial groups for the city wide statistics.

Source: U.S. Bureau of the Census 1992.

Table 10-2

PERCENT OF HOUSEHOLDS CONSIDERED LOW-INCOME IN EACH CENSUS TRACT AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT NAS OCEANA[a]

Census Tract	Total Households	Percent of Households Considered Low-Income
208.04	987	18.0
210.03	2,655	9.3
211.01	1,303	10.6
211.02	1,328	18.3
422.00	2,975	13.6
426.00	1,083	30.9
428.00	3,555	26.3
432.00	179	44.2
436.00	779	10.8
438.00	1,747	24.9
440.01	2,323	36.5
440.02	3,469	32.7
442.01	2,617	45.9
444.01	1,333	9.3
444.02	2,126	23.0
446.00	2,001	17.5
448.04	4,108	31.1
448.05	1,518	42.6
448.06	2,001	46.1
452.00	790	32.6
454.04	2,770	27.0
454.05	1,729	21.1
454.06	1,678	37.8
454.07	1,012	14.8
454.08	1,950	33.9
454.09	2,625	5.3
454.10	683	16.5
454.11	4,463	13.5

Table 10-2

PERCENT OF HOUSEHOLDS CONSIDERED LOW-INCOME IN EACH CENSUS TRACT AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT NAS OCEANA[a]

Census Tract	Total Households	Percent of Households Considered Low-Income
454.13	0	0.0
458.01	1,473	13.6
458.02	2,586	19.2
458.04	3,289	26.0
460.07	3,946	22.8
460.08	2,571	10.7
464.00	1,155	25.9
466.00	344	27.4
Total Affected Area	71,151	23.7
Virginia Beach	135,736	22.6
Chesapeake	52,287	25.5

[a] Does not include NAS Oceana census tract.

Source: U.S. Bureau of the Census 1992.

Table 10-3

TOTAL PERSONS BY RACE AND HISPANIC ORIGIN FOR ALL CENSUS TRACTS AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT MCAS BEAUFORT[a]

Census Tract	Race						Total Persons	Percent Minority
	White	Black	Asian	Indian	Other	Hispanic[b] Origin		
001.00	630	2,539	0	5	4	16	3,194	80.3
002.00	1,777	2,570	13	27	0	52	4,439	60.0
005.00	6,983	3,393	41	141	6	323	10,887	35.9
006.00	1,723	949	7	23	1	83	2,786	38.2
009.00	3,646	1,317	4	19	1	59	5,046	27.7
Total Affected Area	14,759	10,768	65	215	12	533	26,352	44.0
Northern Beaufort County	38,636	22,264	180	776	875	0	62,731	38.4
Beaufort County	59,843	24,582	251	813	936	0	86,425	30.8

[a] Does not include MCAS Beaufort census tract.
[b] Persons of Hispanic origin were assigned to racial groups for countywide statistics.

Source: U.S. Bureau of the Census 1992.

Table 10-4

PERCENT OF HOUSEHOLDS CONSIDERED LOW-INCOME IN EACH CENSUS TRACT AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT MCAS BEAUFORT[a]

Census Tract	Total Households	Percent of Households Considered Low-Income
001.00	1,065	57.9
002.00	1,450	40.0
005.00	3,848	32.1
006.00	1,133	36.6
009.00	1,945	24.5
Total Affected Area	9,441	35.2
Beaufort County	30,654	28.2

[a] Does not include MCAS Beaufort census tract.

Source: U.S. Bureau of the Census 1992.

Table 10-5

TOTAL PERSONS BY RACE AND HISPANIC ORIGIN FOR ALL CENSUS TRACTS AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT MCAS CHERRY POINT[a]

Census Tract	Race						Total Persons	Percent Minority
	White	Black	Asian	Indian	Other	Hispanic[b] Origin		
9611.00	4,521	497	15	97	0	138	5,268	14.2
9613.00	6,658	3,123	67	233	8	434	10,523	36.7
9707.00	7,914	593	88	101	5	185	8,886	10.9
9502.00	3,580	1,197	8	18	0	39	4,842	26.1
Total Affected Area	22,673	5,410	178	449	13	796	29,519	23.2
Craven County	58,478	21,080	536	771	748		81,613	28.4

a Does not include MCAS Cherry Point census tract.
b Persons of Hispanic origin were assigned to racial groups for countywide statistics.

Source: U.S. Bureau of the Census 1992.

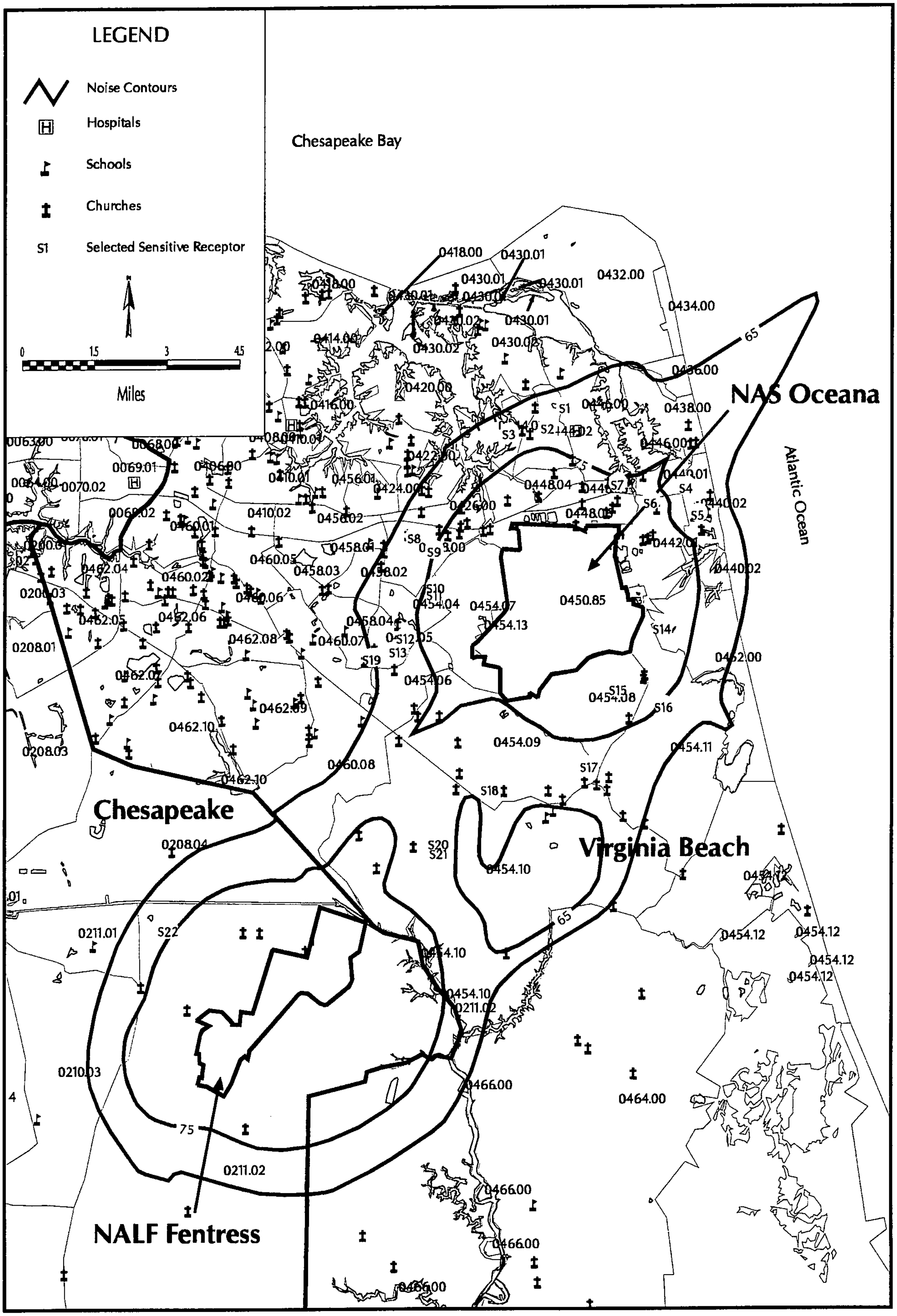
Table 10-6

PERCENT OF HOUSEHOLDS CONSIDERED LOW-INCOME IN EACH CENSUS TRACT AFFECTED BY THE EXPECTED CHANGE IN NOISE LEVELS AT MCAS CHERRY POINT[a]

Census Tract	Total Households	Percent of Households Considered Low-Income
9611.00	1,950	16.7
9613.00	3,719	29.2
9707.00	3,212	22.6
9502.00	2,015	30.1
Total Affected Area	10,896	25.2
Craven County	29,435	28.5

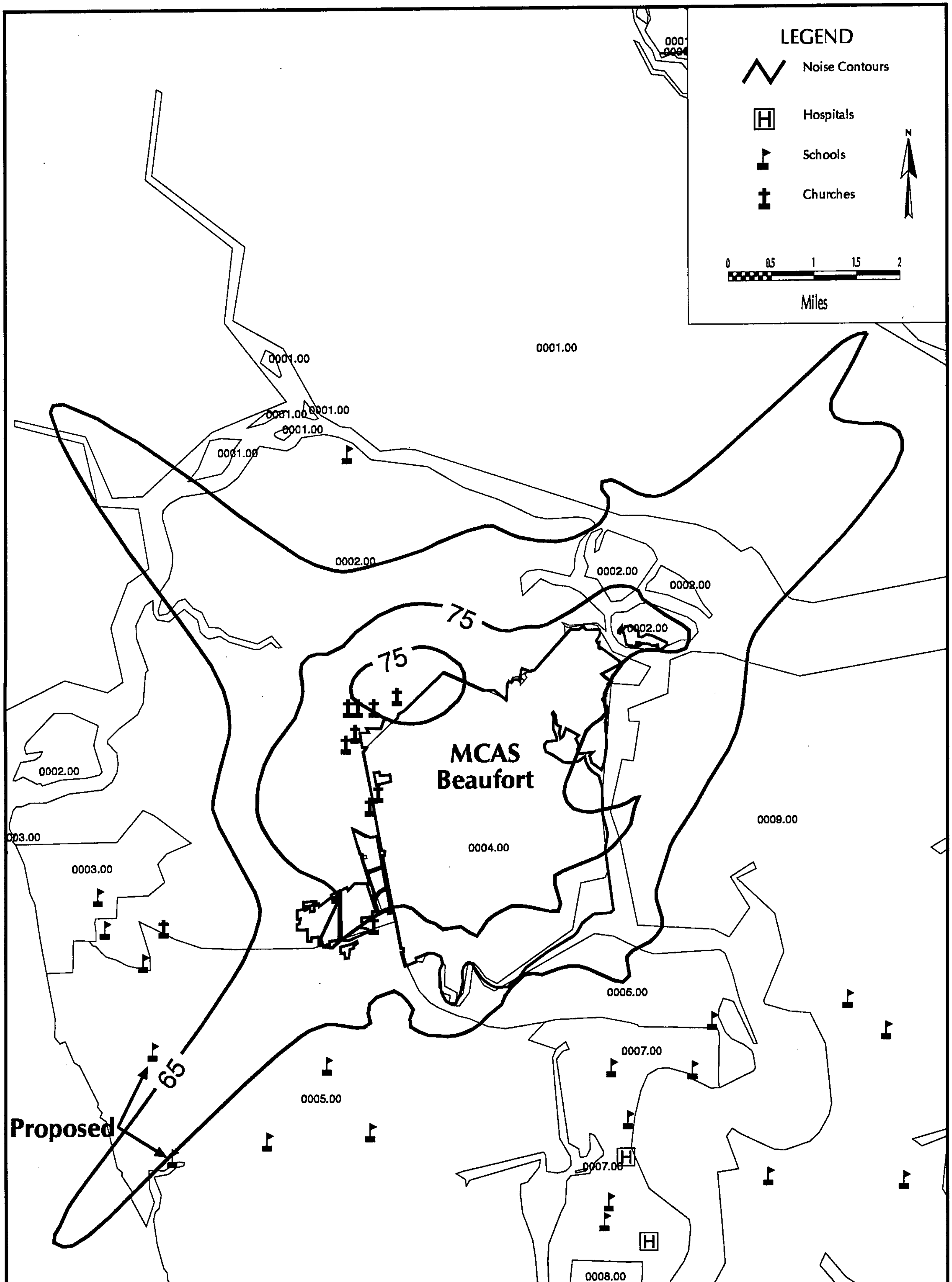
[a] Does not include MCAS Cherry Point census tract.

Source: U.S. Bureau of the Census 1992.



Source: U.S. Bureau of the Census 1992

Figure 10-1
ARS 1 - Noise Contours and Census Tracts
NAS Oceana



Source: U.S. Bureau of the Census 1992

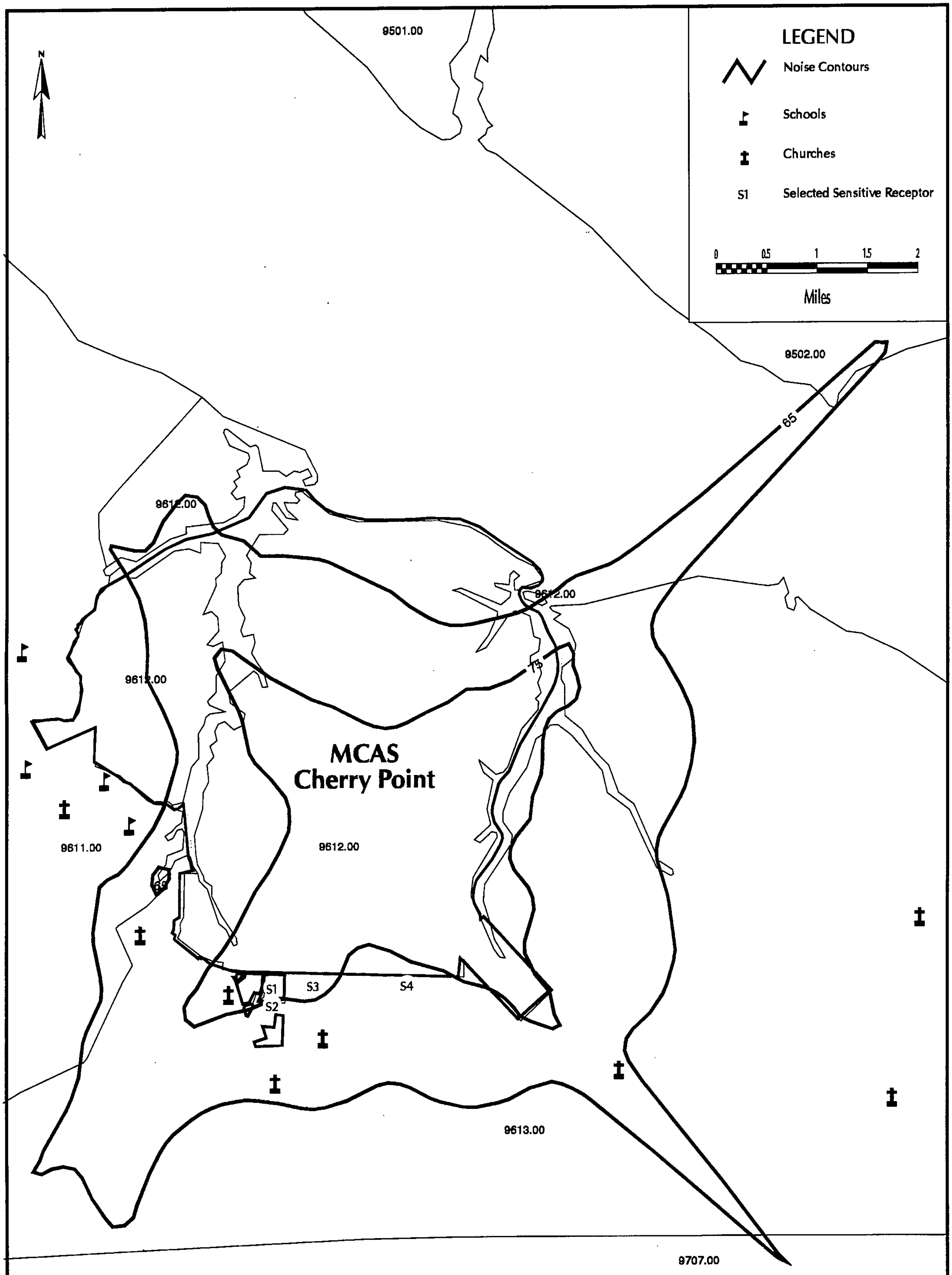
Figure 10-2
ARS 4 - Noise Contours and Census Tracts
MCAS Beaufort

minority groups and low-income households than the county as a whole, the countywide figures are skewed by the presence of Hilton Head Island within the county. This exclusive resort area artificially drives up the median household income and thus increases the total number households considered low-income.

When Hilton Head Island is excluded from the county totals, the area directly impacted by the noise contours is much more representative of the demographic characteristics of northern Beaufort County. Approximately 38.4% of the total population of northern Beaufort County is from minority groups. Unfortunately, median household income statistics are not available for northern Beaufort County, however, the area affected by the noise contours has income levels that are much more representative of northern Beaufort County than of those in the county as a whole. Therefore, the proposed realignment of F/A-18 aircraft to MCAS Beaufort is not expected to disproportionately affect minority or low-income neighborhoods surrounding the station.

Tables 10-5 and 10-6 provide demographic and economic data for all census tracts that would be affected by the projected change in noise levels for MCAS Cherry Point. Table 10-5 shows the racial composition of each census tract, and Table 10-6 shows the percent of low-income households in each tract. Based on 1990 census tract information (see Figure 10-3) and definitions utilized by HUD, approximately 23.2% of the persons living in areas that would be affected by increased noise levels are from minority groups and 25.2% of the households living in the area are considered low-income households. In contrast, approximately 28.4% of the total persons living in Craven County belong to minority groups and 28.5% of the households in Craven County are considered low-income. Therefore, the realignment of FA-18 squadrons and their support personnel would not disproportionately affect minority and low-income neighborhoods surrounding MCAS Cherry Point.

As discussed in Section 1, ample opportunity was provided for community input into the preparation of this DEIS. The Navy held seven public informational meetings/scoping meetings in North Carolina, South Carolina, and in the Virginia Beach area. In addition to providing extensive newspaper and television coverage about these meetings, the Navy has conducted public mailings and has provided and will continue to provide ample opportunity for all individuals and groups to participate in the NEPA process, particularly public interest groups representing minority and low-income populations. The DEIS has been distributed to agencies and those individuals who requested a copy, and has been placed on file at local libraries in each region.



Source: U.S. Bureau of the Census 1992

Figure 10-3
ARS 5 - Noise Contours and Census Tracts
MCAS Cherry Point

11 Unavoidable Adverse Impacts and Considerations that Offset these Impacts

11.1 Alternative Realignment Scenario 1

Unavoidable adverse environmental effects would occur with the realignment of all 11 F/A-18 fleet squadrons and the F/A-18 FRS to NAS Oceana. During construction of facilities to support the operation and maintenance of aircraft/training of personnel, these effects would include potential minor soil erosion, loss of vegetation, and fugitive dust emissions. All of these impacts would be short-term in duration. Long-term impacts of the realignment include primarily increases in aircraft noise, accident potential zones and air emissions from flight operations of the aircraft; the increase in traffic around NAS Oceana; and the increase in population to the City of Virginia Beach and south Hampton Roads.

Considerations that offset these adverse impacts include the mandated need to implement the 1995 BRAC recommendations, enhancement of the operational efficiency of DoD, cost reductions associated with consolidation of activities, and certain mitigative measures proposed to reduce these adverse impacts. Mitigative measures would be implemented during construction, such as the preparation and implementation of soil erosion and sedimentation control plans and stormwater management plans at each of the construction sites, as necessary; and implementation of fugitive dust controls. Noise impacts of operational activities are unavoidable, but may be lessened by measures designed to ensure that aviators maintain established flight tracks and by strengthening procedures for complaint resolution and community outreach as discussed in Section 4.8. Twenty-two schools would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 6 to 22 dB increase over existing conditions. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound

attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 1. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

The increase in population to the metropolitan area of Virginia Beach would impact schools and other public services. However, given the size of the metropolitan area, and the overall influx of income and tax revenue to the area, these impacts would generally be offset by positive gains to the local community. In addition, the construction of a BEQ would alleviate some of the impacts on the local housing market.

11.2 Alternative Realignment Scenario 2

Unavoidable adverse environmental effects would occur with the realignment of nine F/A-18 fleet squadrons and the F/A-18 FRS to NAS Oceana and two F/A-18 squadrons to MCAS Beaufort. Construction-related impacts would be as described above for ARS 1 because all the proposed operational and training support facilities are necessitated for ARS 2 as with ARS 1. Minimal construction is proposed for MCAS Beaufort, and these impacts would not be significant. Operational impacts associated with flight training and maneuvers would be less under ARS 2 than under ARS 1 because they would be distributed over two geographical areas, although increases in noise, accident potential zones, and air emissions would occur above the existing conditions at each of the geographical areas. Twenty-two schools in the vicinity of NAS Oceana would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 21 dB increase over existing conditions. Impacts under ARS 2 are very similar to ARS 1, with reductions of no more than 1 dB occurring at any location. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 2. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

Socioeconomic impacts associated with the influx in military personnel would occur in Beaufort County. When construction of 280 or more new family housing units at the station's Laurel Bay Family Housing Area is completed, family housing availability would be similar to current conditions. Children would attend DoD-controlled schools so impacts on the local school system would be minimal. Any impacts would be offset by an increase in dollars spent within the county.

Considerations that offset these adverse impacts would include the mandated need to implement the 1995 BRAC recommendations, and that, while military training and operations are a necessary element of national security, adverse noise effects and an increase in APZs under this alternative would be shared by more than one community. Mitigative measures would be implemented as under ARS 1. However, the operational efficiency of DoD and cost reductions associated with consolidation of activities would not be maximized under this alternative.

11.3 Alternative Realignment Scenario 3

Unavoidable adverse environmental effects would occur with the realignment of eight F/A-18 fleet squadrons and the F/A-18 FRS to NAS Oceana and three F/A-18 squadrons to MCAS Cherry Point. Construction-related impacts would be as described above for ARS 1 because all the proposed operational and training support facilities are necessitated for ARS 3 as with ARS 1. Minimal construction is proposed for MCAS Cherry Point, and these impacts would not be significant. Operational impacts associated with flight training and maneuvers would be less under ARS 3 than under ARS 1, because, as with ARS 2 these impacts would be distributed over two geographical areas. However, noise, accident potential zones, and air emissions would increase above the existing conditions at each of the geographical areas. Four schools in the vicinity of MCAS Cherry Point would continue to be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 1 to 4 dB increase over existing conditions. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering

evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern. Twenty-two schools in the vicinity of NAS Oceana would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions. Impacts under ARS 3 are very similar to ARS 1, with reductions of 1 to 2 dB at some locations. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 3. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

Socioeconomic impacts associated with the influx of military personnel would occur in Craven and Carteret counties, and in the City of Virginia Beach. Adverse impacts to the schools and the availability of housing would be offset by an increase in dollars spent within these two counties.

Considerations that offset the adverse impacts are as discussed under ARS 2. The realignment is mandated by law. Additionally, while there would be a loss in operational efficiency and a duplication of support services, adverse impacts would be shared by more than one community.

11.4 Alternative Realignment Scenario 4

Unavoidable adverse environmental effects would occur with the realignment of six F/A-18 fleet squadrons and the FRS to NAS Oceana and five F/A-18 fleet squadrons to MCAS Beaufort. Construction-related impacts at NAS Oceana would be less than for ARS 1 because the 3-module hangar would not be required under ARS 4 and the parking apron expansion and alterations would be approximately 50% less compared to ARS 1. During construction of facilities at MCAS Beaufort to support the operation and maintenance of

aircraft and training of personnel, impacts would include potential soil erosion, loss of vegetation, loss of wetland, and fugitive dust emissions. Long-term construction impacts would include loss of wetland, loss of open space, loss of wildlife habitat, and the reconfiguration of land uses, primarily associated with the need to construct a new parallel runway. Operational impacts associated with flight training and maneuvers would be less for NAS Oceana than under ARS 1 because they would be distributed over two geographical areas. However, these impacts would be greater for MCAS Beaufort than under ARS 2 because of additional aircraft operations associated with the five squadrons and inclusion of a new runway. Increases in noise, accident potential zones, and air emissions would occur above existing conditions around each of the installations, however, they would be reduced at NAS Oceana as compared to ARS 1, 2, and 3. Twenty-two schools in the vicinity of NAS Oceana would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions. Impacts under ARS 4 are very similar to ARS 1, with reductions of 1 to 2 dB at most locations. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 4. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

Socioeconomic impacts associated with the influx of military personnel would occur in Beaufort County and in the City of Virginia Beach and would be greater for Beaufort County under ARS 4 than under ARS 2 and less for the City of Virginia Beach under ARS 4 than under ARS 1. When construction of 280 or more new family housing units at MCAS Beaufort's Laurel Bay Housing Area is completed and with the proposed construction of 240 units associated with ARS 4, family housing availability would be similar to current conditions. Children would attend DoD-controlled schools so impacts to the local school system would be minimal. ARS 4 would involve relocation of additional aircraft and personnel compared to ARS 2. Any impacts to the schools and the availability of housing would be offset by an increase in dollars spent within these jurisdictions.

Considerations that offset the adverse impacts are as discussed under ARS 1. The realignment is mandated by law. Mitigation measures at NAS Oceana will be implemented as discussed under ARS 1. Mitigation at MCAS Beaufort will also include measures to lessen impacts to wetland resources associated with the necessary new construction and development of a wetland mitigation plan. Under ARS 4, there would be the greatest loss in operational efficiency among ARS 1, 2, and 3. This would be exhibited in the need for duplication of support services and adverse effects to the operational readiness of F/A-18 squadrons.

11.5 Alternative Realignment Scenario 5

Unavoidable adverse environmental effects would occur with the realignment of six F/A-18 fleet squadrons and the F/A-18 FRS to NAS Oceana and five F/A-18 squadrons to MCAS Cherry Point. Construction-related impacts for NAS Oceana would be less than for ARS 1 because the 3-module hangar would not be required under ARS 5 and the parking apron expansion and alterations would be approximately 50% less compared to ARS 1. During construction of facilities at MCAS Cherry Point to support the operation and maintenance of aircraft and training of personnel, impacts would include potential soil erosion, loss of vegetation, loss of wetland, and fugitive dust emissions. Long-term construction impacts would include loss of wetland, loss of open space, loss of wildlife habitat, and the reconfiguration of land uses primarily associated with the need to construct a new parallel runway. Operational impacts associated with flight training and maneuvers would be less at NAS Oceana under ARS 5 than under ARS 1, because these impacts would be distributed over two geographical areas. However, F/A-18 aircraft at NAS Oceana and MCAS Cherry Point would use the same training ranges. As a result impacts at training ranges would be similar to ARS 1. Noise, accident potential zones, and air emissions would increase above the existing conditions at each of the geographical areas. Four schools in the vicinity of MCAS Cherry Point would continue to be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 1 to 5 dB increase over existing conditions. Impacts under ARS 5 are very similar to ARS 3 with a 1 dB increase at three of the four schools. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools

of particular concern. Twenty-two schools in the vicinity of NAS Oceana would be within noise zones 2 and 3. The projected impacts at these locations vary, ranging from a 5 to 20 dB increase over existing conditions. Impacts under ARS 5 are very similar to ARS 1, with reductions of 1 to 2 dB at most locations. Some of these schools could require sound attenuation to achieve a desired interior noise level of 45 dB. Use of central air conditioning, in association with closed windows, normally reduces interior noise levels by 25 dB. A site-specific engineering evaluation would be required to evaluate indoor noise levels and the level of attenuation needed. Although the Navy does not have the authority to add sound attenuation to schools, it would be willing, if requested, to work with local officials to conduct detailed engineering evaluations at schools of particular concern.

Traffic conditions on roadways in the vicinity of NAS Oceana would be significantly impacted by ARS 5. Specifically, a section of Oceana Boulevard from Bells to Princess Anne would degrade from E to F. This would be considered a significant impact. Several planned traffic improvement projects, including expansion of Oceana Boulevard, would reduce traffic congestion.

Socioeconomic impacts associated with the influx of military personnel would occur in Craven and Carteret counties, and in the City of Virginia Beach. Adverse impacts to the schools and the availability of housing would be offset by an increase in dollars spent within these two counties.

Considerations that offset the adverse impacts are as discussed under ARS 2. The realignment is mandated by law. Additionally, while there would be a loss in operational efficiency and a duplication of support services, adverse impacts would be shared by more than one community.

12 Relationship Between Short-Term Uses of the Environment and the Enhancement of Long-Term Productivity

12.1 Alternative Realignment Scenario 1

Short-term uses of the environment associated with the proposed action would include minor environmental impacts to the physical environment during the construction phase of proposed facilities. Construction would require minor changes in land use at the station and would involve minor short-term increases in fugitive dust emissions, and construction-generated noise. None of the short-term uses would significantly impact the long-term productivity of the natural resources of the area.

In addition, the construction projects would require expenditures of public funds/resources and the use of labor to complete the projects, resulting in lost opportunity costs. Implementation of the proposed action would enhance the socioeconomic productivity of DoD and the City of Virginia Beach and south Hampton Roads. The closure of NAS Cecil Field and the realignment of Atlantic Fleet F/A-18 aircraft at NAS Oceana would save operational costs of DoD as determined by the BRAC Commission by consolidating training and support activities and reducing excess capacity where possible. The long-term productivity of the City of Virginia Beach and south Hampton Roads would be enhanced as the federal government injects additional income through procurement and payroll expenditures.

12.2 Alternative Realignment Scenario 2

The relationship between short-term use of the environment and the enhancement of long-term productivity of the natural resources of the area around NAS Oceana and MCAS Beaufort for ARS 2 is the same as discussed for ARS 1.

Short-term uses of dollars and labor would enhance the long-term productivity of the counties surrounding MCAS Beaufort as well as NAS Oceana. However, the long-term productivity of government operations is lessened by siting aircraft in two separate locations.

12.3 Alternative Realignment Scenario 3

The relationship between short-term use of the environment and the enhancement of long-term productivity of the natural resources of the area around NAS Oceana and MCAS Cherry Point for ARS 3 is the same as discussed for ARS 1 and ARS 2.

Short-term uses of dollars and labor would enhance the long-term productivity of the counties surrounding MCAS Cherry Point as well as NAS Oceana. However, the long-term productivity of government operations is lessened by moving aircraft to two separate locations.

12.4 Alternative Realignment Scenario 4

The relationship between short-term use of the environment and the enhancement of long-term productivity of the natural resources of the area around NAS Oceana and MCAS Beaufort for ARS 4 is the same as discussed for ARS 1. Under this alternative, the construction of a new runway would result in long-term use of wetland areas. This would be mitigated by developing and implementing a wetland mitigation plan.

Short-term uses of dollars and labor would enhance the long-term productivity of the counties surrounding MCAS Beaufort as well as NAS Oceana. However, the long-term productivity of government operations is lessened by siting F/A-18 fleet squadrons in two separate locations. In fact, in the long term, this alternative would result in the greatest loss of productivity and operational readiness among ARS 1, 2, and 3 by requiring duplication of support/training activities.

12.5 Alternative Realignment Scenario 5

The relationship between short-term use of the environment and the enhancement of long-term productivity of the natural resources of the area around NAS Oceana and MCAS Cherry Point for ARS 5 is the same as discussed for ARS 1. Under this alternative, the construction of a new runway would result in long-term use of wetland areas. This would be mitigated by developing and implementing a wetland mitigation plan.

Short-term uses of dollars and labor would enhance the long-term productivity of the counties surrounding MCAS Cherry Point as well as NAS Oceana. However, the long-term productivity of government operations is lessened by siting F/A-18 fleet squadrons in two separate locations. This alternative would be similar to ARS 4 in the resulting loss of productivity and operational readiness and duplication of support/training activities.

13 Irreversible and Irretrievable Commitments of Resources

13.1 Alternative Realignment Scenario 1

The implementation of the proposed action would result in commitments of resources that are irreversible and irretrievable. Construction of proposed projects to support the relocated aircraft at NAS Oceana would involve the use of existing structures and land area that, upon completion of these projects, would not be available for other usage. Other resources committed would include public funds for construction, labor, fossil fuels for construction vehicles, and building materials. Operation of the facilities would require additional use of natural resources, including supplies of water, natural gas, and electricity.

13.2 Alternative Realignment Scenario 2

Irreversible and irretrievable commitments of resources for ARS 2 are essentially the same as for ARS 1. Additional resources would be used to complete the construction/ renovation projects at MCAS Beaufort.

13.3 Alternative Realignment Scenario 3

Irreversible and irretrievable commitments of resources for ARS 3 are essentially the same as for ARS 1. Additional resources would be used to complete the construction/ renovation projects at MCAS Cherry Point.

13.4 Alternative Realignment Scenario 4

Irreversible and irretrievable commitments of resources for ARS 4 are essentially the same as for ARS 1. Additional resources would be used to complete the construction/ renovation projects at MCAS Beaufort.

13.5 Alternative Realignment Scenario 5

Irreversible and irretrievable commitments of resources for ARS 5 are essentially the same as for ARS 1. Additional resources would be used to complete the construction/ renovation projects at MCAS Cherry Point.

14 Consistency with Other Federal, State and Local Plans, Policies and Regulations

14.1 Applicable Statutes and Regulations

The proposed action is guided by the following laws, executive orders, and their appropriate implementing regulations:

- Base Closure and Realignment Act of 1990 (BRAC);
- National Environmental Policy Act (NEPA) (42 U.S.C. 4321, et. seq.);
- OPNAVINST 5090.1B, Chapter 2, Navy Procedures for Implementing NEPA;
- Endangered Species Act (42 U.S.C. 7401, et seq.);
- Fish and Wildlife Coordination Act (16 U.S.C. 661, et. seq.);
- Clean Air Act (42 U.S.C. 7401, et. seq., as amended);
- National Historic Preservation Act (16 U.S.C. 470 (f));
- Clean Water Act (33 U.S.C. 1251, et seq.);
- Executive Order 11990, Protection of Wetlands, dated May 24, 1977;
- Executive Order 11988, Floodplain Management, as amended by Executive Order 12148, dated July 20, 1979;
- Coastal Zone Management Act (16 U.S.C. 1451, et. seq.);
- Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901, et. seq.);
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601, et. seq.);

- Occupational Health and Safety Act (29 U.S.C. 651, et. seq.);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations; and
- Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks.

14.2 Overview of Regulatory Consistency

This DEIS has been prepared in compliance with BRAC, NEPA, and OPNAVINST 5090.1B, Chapter 2. Specifically, the DEIS considers environmental consequences of five ARSs for the transfer of F/A-18 aircraft from NAS Cecil Field. The document will be on file for review and comment to all appropriate federal, state, and local agencies, organizations, and interested persons.

In compliance with the Endangered Species Act and the Fish and Wildlife Coordination Act, a review of the construction sites under each of the ARSs was conducted in relation to the existing threatened and endangered species inventory for each station, to determine the potential impacts to these species and fish and wildlife habitats. No threatened or endangered species have been documented at NAS Oceana (VDCR 1990). Threatened and endangered species do occur at MCAS Cherry Point and MCAS Beaufort. Appropriate state and federal agencies were contacted to confirm the findings of the inventory and to determine if any new species were identified at the station since its publication. Responses from these agencies confirmed that the construction or operational activities proposed in ARS 1, 2, and 3 will result in no effect to threatened and endangered species. Consultation regarding potential impacts to species at MCAS Beaufort under ARS 4 and MCAS Cherry Point under ARS 5 is ongoing. Additionally, the National Marine Fisheries Service will be consulted regarding potential impacts to marine species from increases in air operations to coastal training areas.

In compliance with the Clean Air Act, the potential impacts to air quality at NAS Oceana resulting from the location of the F/A-18 aircraft were examined. NAS Oceana is located within an ozone nonattainment area. It was determined that emissions associated with realignment of F/A-18 aircraft to NAS Oceana are accounted for in the emissions budget for the Hampton Roads region, set forth in its maintenance plan (see Appendix E).

In compliance with the National Historic Preservation Act, the SHPOs in Virginia, North Carolina, and South Carolina, were contacted, and determined that none of the proposed construction projects affected any structure that is eligible for listing on the National Register for Historic Places. At NAS Oceana, a Phase I archaeological identification survey was also conducted and was forwarded to the SHPO for review. SHPO concurred with the

findings of the report that proposed construction projects would not impact archaeological resources. At MCAS Cherry Point, previous studies of project areas indicated that there would be no impact to cultural resources as a result of ARS 3, however, additional investigations would be required for the proposed runway for ARS 5. SHPO consultation and investigations are ongoing. At MCAS Beaufort, no documented cultural resources would be affected by projects under ARS 2, however, additional investigations would be required for the proposed runway under ARS 4. SHPO review/concurrence for projects proposed as part of ARS 4 is currently ongoing.

In compliance with the Clean Water Act and Executive Order 11990, development in wetland areas at NAS Oceana has been avoided. At MCAS Cherry Point, wetland areas have been avoided for ARS 3, however, wetlands would be affected by the construction of a runway under ARS 5. These impacts would be lessened through the implementation of a wetland mitigation plan, which would be approved by North Carolina Division of Coastal Management and USACE. At MCAS Beaufort, development in wetland areas has been avoided under ARS 2, however, wetlands would be affected by the construction of a new runway under ARS 4. These impacts would be lessened through the implementation of a wetland mitigation plan, which would need to be approved by the South Carolina Office of Oceans and Coastal Resource Management and USACE.

In compliance with Executive Order 11988, ARS 1, 2, 3, and 4 would not involve construction within a floodplain. ARS 5 would have a parallel runway with a clear zone located in the floodplain of Hancock Creek. Emergent vegetation would not be disturbed and no structures would be constructed in the floodplain.

In compliance with the Coastal Zone Management Act, all projects have been assessed with regard to the respective coastal zone management programs in Virginia, North Carolina, and South Carolina. In Virginia, consistency would be demonstrated through compliance with Virginia's permit programs (i.e., VPDES). In North Carolina, projects would be designed with applicable permit requirements and best specified in CAMA requirements to control stormwater management practices, especially regarding impacts to wetlands and control of runoff to avoid any degradation to water quality in coastal areas; concurrence on the consistency determination will be coordinated with NCDEHNR. In South Carolina, projects would be conducted following appropriate soil erosion and stormwater management plans and wetland mitigation plans to avoid impacts to coastal resources in accordance with the South Carolina Office of Ocean and Coastal Resource Management.

In compliance with RCRA, CERCLA, and OSHA, all proposed projects under each of the ARSs have been screened for potential impacts to existing SWMUs or IRP sites and

have been coordinated with planned remedial actions in these areas and would not significantly contribute to the generation of any new industrial waste streams.

In compliance with Executive Order 12898, the environmental justice issues have been assessed for this project and minority or low-income populations would be not disproportionately affected by environmental impacts resulting from any of the ARSs.

In compliance with Executive Order 13045, federal agencies are required to ensure that their policies, programs, and activities address disproportionate environmental health risks and safety risks to children. As a result schools were identified near NAS Oceana, MCAS Beaufort, and MCAS Cherry Point. Schools located within the projected 65 dB Ldn were identified and Leq (dB) levels were calculated. Any schools with an Leq greater than 70 dB would require an engineering evaluation to determine if sound attenuation would be required.

15 Required Permits and Approvals

Table 15-1 outlines all necessary reviews, approvals, and permits required to implement each of the ARSs.

Table 15-1

REVIEWS AND PERMITS REQUIRED TO IMPLEMENT EACH OF THE ARSs

Review/Permit	Responsible Agency(s)	Action Requiring Review/Permit	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Federal							
National Environmental Policy Act Documentation	U.S. Department of the Navy	Realignment of F/A-18 aircraft from NAS Cecil Field	●	●	●	●	●
Air Conformity Review under the 1990 Clean Air Act Amendments	U.S. Department of the Navy	Federal action (i.e., realignment at NAS Oceana) resulting in a change of air emissions in an area designated as nonattainment for one or more criteria pollutants designated under the Clean Air Act.	●	●	●	●	●
Section 7 of the Federal Endangered Species Act	U.S. Fish and Wildlife Service	Construction and operational changes associated with realignment of F/A-18 aircraft from NAS Cecil Field.	●	●	●	●	●
Section 7 of the Endangered Species Act	U.S. National Marine Fisheries Service	Increase in air operations in coastal training aras	●	●	●	●	●
Section 404 of the Clean Water Act	U.S. Army Corps of Engineers	Impacts to jurisdictional wetlands				●	●
Commonwealth of Virginia							
Permit to Construct and Operate New Stationary Source	Virginia Department of Environmental Quality, Air Division	Construction and operation of new corrosion control hangar associated with realignment of aircraft to NAS Oceana.	●	●	●	●	●

Table 15-1

REVIEWS AND PERMITS REQUIRED TO IMPLEMENT EACH OF THE ARSs

Review/Permit	Responsible Agency(s)	Action Requiring Review/Permit	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
Review for effects to resources on the National Register of Historic Places (or National Register-eligible resources) under Section 106 of the National Historic Preservation Act	U.S. Department of the Navy Virginia Department of Historic Resources	Construction of new facilities and additions to existing structures associated with realignment of aircraft to NAS Oceana.	●	●	●	●	●
Amendment to Station's Virginia Pollution Discharge Elimination System Permit	Virginia Department of Environmental Quality, Water Quality Division	Land alteration of more than 5 acres.	●	●	●	●	●
State of South Carolina							
Coastal Zone Consistency Determination	South Carolina Office of Ocean and Coastal Resource Management	Construction at MCAS Beaufort within Coastal Zone.		●		●	
Stormwater Management Permits	South Carolina Office of Ocean and Coastal Resource Management	Land disturbance at MCAS Beaufort greater than 2 acres in the Coastal Zone.		●		●	
Wetland Mitigation Plan Approval	South Carolina Office of Ocean and Coastal Resource Management	Mitigation of impacts to federally-defined jurisdictional wetlands.				●	
Erosion and Sedimentation Permit	South Carolina Office of Ocean and Coastal Resource Management	Land disturbing activities in the Coastal Zone.				●	
State of North Carolina							
Coastal Zone Consistency Determination	North Carolina Office of Coastal Zone Management	Construction at MCAS Cherry Point within Coastal Zone. Increase in air operations in coastal training areas.	●	●	●	●	●

Table 15-1

REVIEWS AND PERMITS REQUIRED TO IMPLEMENT EACH OF THE ARSs

Review/Permit	Responsible Agency(s)	Action Requiring Review/Permit	ARS 1	ARS 2	ARS 3	ARS 4	ARS 5
National Pollutant Discharge Elimination System (NPDES) discharge permit	North Carolina Department of Environment, Health, and Natural Resources	Construction of facilities at MCAS Cherry Point.			●		●
Sanitary Permit	North Carolina Department of Environment, Health, and Natural Resources	Operation of facilities at MCAS Cherry Point.			●		●
Sedimentation and Soil Erosion Control Permit	North Carolina Department of Environment, Health, and Natural Resources	Construction of facilities at MCAS Cherry Point.			●		●
Water Permit	North Carolina Department of Environment, Health, and Natural Resources	Operation of facilities at MCAS Cherry Point.			●		●
Regional Agencies							
Amendment to NAS Oceana Wastewater Permit	Hampton Roads Sanitation District	Change in wastewater flow associated with realignment to NAS Oceana.	●	●	●	●	●

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Virginia Beach, VA 23452

Beaufort County Library
311 Scott Street
Beaufort, SC 29902

Pamlico County Library
603 Main Street
Bayboro, NC 28515

Dare County Library
P.O. Box 1000
Manteo, NC 27954

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